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CHEMISTRY



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ADSORPTION

UDC 541.104

STUDY OF NATURE OF ADSORPTION CENTERS IN IRRADIATED ZEOLITE BY ELECTRON PARAMAGNETIC RESONANCE METHOD

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 5, May 84 pp 1131-1134

YERMATOV, S. Ye., MOSIYENKO, T. A. and TUSEYEV, T., Kazakh SSR Academy of Sciences, Institute of Nuclear Physics; Kazakh State University imeni S. M. Kirov, Alma-Ata

[Abstract] The formation and annealing of additional radiation adsorption centers of certain reagents on Na- and Ca-substituted A and X zeolites was studied as the adsorption systems were irradiated. The method of activation included annealing in air and in oxygen and thermal vacuum annealing at 400°C after etching in dilute hydrochloric acid. The zeolite surface was saturated with air, oxygen, pyridine and ethanol vapors to an equilibrium pressure of 10^{-1} mmHg before gamma and proton radiolysis studies were begun. EPR spectra were recorded. The EPR data confirm the mechanism of formation and annealing of acceptor centers and to some extent facilitate an understanding of the nature of the oxidation activity of irradiated zeolite. Upon gamma and proton bombardment, captured charge carriers participate in the formation of adsorption and catalytic centers. The nature of these centers is related to the biographic and radiation defects in the surface on which oxygen stabilizes upon radiolysis. Figures 6; references 9: Russian.

UDC 541.104

INFLUENCE OF GAMMA RADIATION ON ADSORPTION PROPERTIES OF RARE EARTH ELEMENT AND YTTRIUM OXIDES

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 5, May 84 pp 1135-1138

YERMATOV, S. Ye., AKSENOVA, T. I. and TULEUOVA, A., Kazakh State University imeni S. M. Kirov, Kazakh SSR Academy of Sciences; Institute of Nuclear Physics, Alma-Ata

[Abstract] A comparative study is presented of processes of adsorption of oxygen, hydrogen and water vapor on gadolinium, terbium and yttrium oxides exposed to gamma radiation. Adsorption of the gases on the oxides was studied

by manometric and IR spectroscopic methods. It was found that the greatest adsorption capacity is characteristic for yttrium oxide, followed by gadolinium and terbium oxides. Gadolinium and terbium oxides, members of the lanthanide group, have almost identical adsorption properties but differ significantly from yttrium oxide, also in the third group of the periodic table, but with differing electron shell structure. Yttrium oxide also differs in its paramagnetic properties. Gamma radiation changes the concentration of free charge carriers which can participate in adsorption. Figures 4; references 3: Russian.

UDC 539.104

INFLUENCE OF IRRADIATION WITH CHARGED PARTICLES ON ADSORPTION PROPERTIES OF RARE EARTH ELEMENT OXIDES

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 5, May 84 pp 1139-1142

YERMATOV, S. Ye. and TUSEYEV, T., Kazakh SSR Academy of Sciences, Institute of Nuclear Physics; Kazakh State University imeni S. M. Kirov, Alma-Ata

[Abstract] A study is made of the influence of proton and alpha radiation on the adsorption properties of certain rare earth element oxides. Specimens were prepared and irradiated in the isochronic cyclotron of the authors' institute by protons with energy 30 MeV and alpha particles with energy 40 and 50 MeV. Comparison of the electroproton and alpha irradiation indicates that whereas with proton bombardment adsorption-active centers of just one type (hole) are formed, with alpha bombardment both hole and electron centers may form, though the quantity of electron centers is significantly greater than the formation of holes. Experiments at different flux densities showed that the rate of accumulation of active centers increases linearly to a certain point, after which further increases cause no increase in rate of accumulation or cause radiation annealing of adsorption centers. Figures 4; references 8: 7 Russian, 1 Western.

UDC 541.182.644+547

SPECIFIC RESPONSE TO MODIFICATION BY ORGANIC MOLECULES IN ADSORPTION AND CATALYSIS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 4, Apr 84
(manuscript received 7 Sep 82) pp 871-875

KARZHAVINA, N. P. and MARDASHEV, Yu. S., Moscow State Pedagogic Institute imeni V. I. Lenin

[Abstract] A discussion is presented of the thermodynamic aspect of modification of solids by molecules of organic substances for the particular case of creation of specific materials based on inert ionic substrates with islands

of small crystals from an active metal such as Ni, Co, Au, Cu or Ag. The modifiers are polar molecules of alcohols in which alkali and alkaline earth metal fluorides are practically insoluble. It is suggested that the model of a hard, flat surface be used as an idealized model, dividing the surface into a small number of sectors with different adsorption energies. Thermodynamic considerations indicate that the formation of specific sectors on the surfaces of solid adsorbents and catalysts may result from the reconstructing effect of a modifier. The reverse influence of the modified surface of the solid body on the substrate is manifested in the value of the adsorption coefficient. References 16: 10 Russian, 6 Western.

UDC 543.544.2

USE OF CERTAIN INORGANIC SALTS AS ADSORBENTS FOR GAS CHROMATOGRAPHY

Ivanova IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 27, No 6, Jun 84 (manuscript received 10 Nov 82) pp 681-684

YEGOROVA, K. V., PETROVA, Ye. I., VISHNITSKAYA, G. A. and KOTOVA, N. N., Department of General Chemistry and Chromatography, Kuybyshev State University

[Abstract] Sorbents were prepared by saturating silochrome-3 with alcohol solutions of salts with the addition of PFNS-4, then held at 423-473K until the solvent was completely removed. Measurements were performed on a chromatograph at 353-403K. The sorbates were C₆-C₉ n-alkanes and C₆-C₈ alkylbenzenes. The resulting data indicate that the immobile phases studied are of low polarity. One advantage of the adsorbents produced in the analytic aspect is the linear nature of the isotherms obtained over a broad temperature range. Figures 3; references 6: 2 Russian, 4 Western.

UDC 541.183

ADSORPTION OF FLUORIDE IONS FROM AQUEOUS SOLUTION BY KU-2 CATIONITE IN Al-FORM

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR in Russian No 6, Jun 84 (manuscript received 11 Oct 83) pp 45-47

SAMCHENKO, Z. A. and GORONOVSKIY, I. T., Institute of Colloid Chemistry and Water Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Results are presented from studies of the sorption of fluorides by strongly acid sulfostyrene cationite KU-2x8 in Al-form. The purpose of the work was to study the conditions of extraction of fluoride ions from aqueous solutions of electrolytes and to determine the possibility of achieving the potential capacity of a sorbent related to the formation of low-solubility

sorption compounds. Studies were performed on individual sodium fluoride solutions, with fluoride ion concentration 5 mg/dm^3 , and natural water containing the same quantity of NaF under dynamic conditions on a column 0.8 cm in diameter with a charge height of 10 to 12 cm and a linear filtration rate of 2.5-3.0 m/hr. It was found that the pH of the tap water filtered through the cationite dropped from 8.2 to 3.5, alkalinity from $3 \cdot 10^{-3}$ to 0 mol/dm^3 , total content of chlorides and sulfates also decreased slowly. Results indicate that favorable conditions are created in the ion exchange column for the formation of a precipitate of oxy-salts of aluminum having high sorption capacity with respect to chlorine ions. Figure 1; references 7: Russian.

RESULTS OF STUDY OF METABOLISM AND BIOSYNTHESIS OF ANABASIS APHYLLA L.
ALKALOIDS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in
Russian No 4, Jul-Aug 84 pp 22-30

KLYSHEV, L. K., Institute of Botany, KaSSR Academy of Sciences, Alma-Ata

[Abstract] Fundamental achievements in research concerning biosynthesis and metabolic conversions of anabasis aphylla L. alkaloids were described and discussed. It was found that, in contrast to the situation in other plants, $2C^{14}$ -lysine is incorporated into anabasis aphylla only in the piperidine cycle of anabasin and its $2C^{14}$ occupies the second position of this heterocycle, indicating that the amino group of lysine participates in formation of the alkaloid. Lysine is incorporated into all types of anabasis alkaloids. A newly realized method of biosynthesis of alkaloids in acellular extracts from green anabasis shoots is being used extensively for production of labelled alkaloids. Several forms of epiphytic microflora of anabasis aphylla L. which readily oxidize anabasin have been isolated. Experiments have shown that introduction of C^{14} -anabasin, C^{14} -lupinine or C^{14} -aphylline into a plant results in appearance of nearly 70-90 percent of the radioactive label in $C^{14}O_2$ in the first days. Excess alkaloid is expended mainly in respiration and energy production and is partially transformed into other alkaloids and non-alkaloid compounds. An enzyme given the name anabasinoxidase was isolated from bacterial cells and purified and its molecular properties were studied. Figures 9; references 42: 15 Russian, 27 Western.
[358-2791]

NUCLEAR MAGNETIC RESONANCE STUDY OF ALKALOIDS, PART 6: COMPARISON OF STEREO-CHEMISTRY OF PSEUDOKOPSININE AND 14, 15-DIHYDROVINDOLININE ACCORDING TO C-NUCLEAR MAGNETIC RESONANCE SPECTRA

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 3, May-Jun 84
(manuscript received 4 May 83) pp 334-337

YAGUDAYEV, M. R., Order of Labor Red Banner Institute of Chemistry of Plant Substances, UzSSR Academy of Sciences, Tashkent

[Abstract] Production of ^{13}C nuclear magnetic resonance spectra of pseudokopsinine on a Varion XL-100-15 spectrometer at a frequency of 25.16 MHz in CDCl_3 on a pulsed regime with a subsequent Fourier transform under conditions of complete and incomplete isolation of C-H interactions was used to compare and analyze carbons of pseudokopsinine; its synthetic analog 14,15-dihydrovondoline is described and discussed. Differences in the stereochemistry of these 2 compounds are pointed out. Figure 1; references 12: 5 Russian, 7 Western.
[357-2791]

UDC 541.127+537.57+547.94+615.322

IONIZATION CONSTANTS OF SOME ALKALOIDS USED IN MEDICINE

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 3, May-Jun 84
(manuscript received 13 May 83) pp 337-341

PEREL'SON, M. Ye., PERSIYANOVA, I. V. SEMENOVA, T. S. and KOPLOVA, I. Ye.,
All-Union Scientific Research Institute of Medicinal Plants, Moscow

[Abstract] Measurement of pKa values of some alkaloids in water and aqueous ethyl alcohol by potentiometric titration produced the following figures for pKa: nuphlein bisanhydrodichloride- 4.59, 6.98; brevicollin dihydrochloride- 5.17, 8.02; chelidonine- 6.40; sarguianrine bisulfate- 7.32; chelerythrine bisulfate- 7.53; stephanine sulfate- 8.48 and d-pseudoephedrine hydrochloride- 9.49. The 2 pKa values for nuphlein and brevicollin represent their two nitrogen atoms with the capacity for protonization. Figure 1; references 3: 2 Russian, 1 Western.
[357-2791]

NUCLEAR MAGNETIC RESONANCE STUDY OF ALKALOIDS, PART 7: ^{13}C NUCLEAR MAGNETIC RESONANCE SPECTRA AND STRUCTURE OF 'KOPSANONE' AND KOPSINILAME

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 3, May-Jun 84
(manuscript received 30 May 83) pp 344-346

YAGUDAYEV, M. R., Order of Labor Red Banner Institute of Plant Substances,
UzSSR Academy of Sciences, Tashkent

[Abstract] Study of ^{13}C nuclear magnetic resonance spectra of 5,22-dioxokopsane and the well-known alkaloid kopsinilame is described and discussed. Study of ^{13}C nuclear magnetic resonance spectra of a base previously isolated from the *Vinca erecta* plant and thought to be kopsanone showed that this base is 5,22-dioxokopsane. Figure 1; references 12: 3 Russian, 9 Western.
[357-2791]

METHOD OF QUANTITATIVE DETERMINATION OF ADLUMINE IN CORYDALIS SEMPERVIRENS AND SUBSTANCES

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 3, May-Jun 84
(manuscript received 9 Jun 83) pp 346-349

KRIVUT, B. A., FEDYUNINA, N. A., MARGVELASHVILI, N. N. and MOLODOZHNIKOV, L. M., First Moscow Order of Lenin and Order of Labor Red Banner Medical Institute imeni I. M. Sechenov

[Abstract] A chromospectrometric method of quantitative determination of the biologically-active alkaloid adlumine in *Corydalis Sempervirens*, involving determination of the optical density of an aqueous solution of the substance, is described and discussed. Use of the method made it possible to determine adlumine to an accuracy of 0.79 percent in a substance and to an accuracy of 3.62 percent in the plant material. References 5: Russian.

UDC 543.544.45-677.494.745.32

CONTENT OF HCN IN PYROLYSIS GASES OF COMPOSITE MATERIALS REINFORCED WITH
POLYACRYLONITRILE-CONTAINING FIBERS

Tallinn IZVESTIYA AKADEMII NAUK ESTONSKOY SSR: KHIMIYA in Russian Vol 33,
No 3, Jul-Aug 84 (manuscript received 27 Dec 83) pp 171-174

PANOVA, L., KOGERMAN, AYLI, ARTEMENKO, SERAFIMA, KIRRET, O., VILKOVA, S. and
KHALTURINSKIY, N., Saratov Polytechnic Institute; Institute of Chemistry,
Estonian SSR Academy of Sciences

[Abstract] A study was made of the content of HCN in the pyrolysis gases of composite materials based on chemical fibers. The studies included chemical fibers in mass production containing polyacrylonitrile and phenol-formaldehyde resin-based composite materials. Polyacrylonitrile fiber is more thermally stable. Introduction of chlorine to the polymer macromolecule as in acrylonitrilevinyl chloride fiber decreases the thermal stability of the fiber due to the presence of the thermally less-stable C-Cl bond. The yield of HCN from all types of fibers and composites tested has an extreme in the 220-550°C temperature range studied. The highest yield of HCN from polyacrylonitrile fibers is observed at 350°C. The content of HCN in the pyrolysis gases can be decreased by replacing copolymer fiber consisting of acrylonitrile plus vinyl chloride with a mechanical mixture of polyacrylonitrile and polyvinyl chloride fibers. Figures 2; references 4: 3 Russian, 1 Western.
[363-6508]

UDC 543.25

CARBON FIBER - NEW ELECTRODE MATERIAL IN ELECTROCHEMICAL ANALYSIS METHODS.
BACKGROUND CURRENTS

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 39, No 4, Apr 84
(manuscript received 28 Jun 83) pp 607-612

DORONIN, A. N. and MUNTYANU, G. G., Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, USSR Academy of Sciences, Moscow; Institute of Chemistry, Moldavian Academy of Sciences, Kishinev

[Abstract] A study is made of the background currents of a carbon fiber element electrode used in the chemisorption of hydrogen and oxygen. A study

was performed in a thin-layer cell consisting of a capillary tube with a mercury contact system. Volt-ampere curves were measured potentiodynamically at $25 \pm 1^\circ\text{C}$. At potentials of +1.4 V the electrode surface was found to change irreversibly. In inversion methods of analysis when a carbon fiber is used as the electrode, accumulation should be performed at potentials such that the adsorption of oxygen and hydrogen are minimal. In direct volt-ampere methods to decrease background currents the electrode should be polarized at -1.0-+1.0 V, desorbing hydrogen or oxygen depending on the analytic problem at hand. Figures 5; references 4: 3 Russian, 2 Western.
[278-6508]

UDC 543.544

INTERPRETATION OF CHLOROHYDROCARBON PYROGRAMS

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 39, No 4, Apr 84
(manuscript received 17 Jan 83) pp 707-710

STEPANENKO, V. Ye., PEREMITIN, I. V. and OGLOBLINA, I. P.

[Abstract] Studies are presented of the regularities of thermal destruction of chlorinated hydrocarbons in an atmosphere of hydrogen. The experimental installation was based on a chromatograph to allow investigation of the products of pyrolytic decomposition of the substances in question by repeated pyrolysis. A table presents the initial compounds and the composition of the products of pyrolysis. It is found that the pyrolysis of volatile chlorinated hydrocarbons in hydrogen after preliminary separation in a chromatographic column can be used to identify chlorinated hydrocarbons. Reaction equations are presented allowing prediction of the composition of the decomposition products. References 6: Russian.

SYNTHESIS OF INORGANIC MATRICES FOR IMMOBILIZATION OF ENZYMES BY CHEMICAL ASSEMBLY AND STUDIES OF THEIR PROPERTIES

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 6, Jun 84
(manuscript received 30 Dec 83) pp 1428-1430

GIMANOVA, I. M. and POSTNOV, V. N., Leningrad State University imeni A. A. Zhdanov

[Abstract] An inorganic matrix is modified using the method of chemical assembly--synthesis of a polypeptide chain on a surface by alternating reactions with terminal functional groups. The initial matrix is silochrome s-120 with effective pore radius 13 nm, surface 130 m²/g. It is found that, with a given length of insert molecule, the terminal NH₂ groups interact with the surface. The synthesis of heterogeneous biocatalysts shows that, for a given insert molecule length, there is a significant increase in activity, allowing regulation of catalyst activity. References 5: Russian.

CATALYSIS

UDC 541.64:543.422.4:546.212:547(256.2 + 422)

IR-SPECTROSCOPIC STUDY OF COMPLEX CATALYST TRI-ISO-BUTYLALUMINUM-WATER-ZINC ACETYLACETONATE USED IN POLYMERIZATION OF PROPYLENE OXIDE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 26, No 8, Aug 84
(manuscript received 25 Jan 83) pp 1634-1639

IKONITSKIY, I. V., MARASANOVA, N. N., RODINA, E. I., SILINA, N. A. and GORIN, Yu. A., All-Union Scientific Research Institute of Synthetic Rubber imeni S. V. Lebedev

[Abstract] Experimental results were reported showing that the activity of the catalytic system tri-iso-butylaluminum (TIBA):H₂O:Zn(AcAc)₂ = 1:1:0.25 used in polymerization of propylene oxides (PO) depends on the method of its formation. The catalysts obtained by reactions of concurrently mixed components are more active than those prepared by reacting Zn(AcAc)₂ with preformed poly-iso-butyl-alumoxane. On the basis of Kuntz and Kroll hypothesis, it could be assumed that one of the reasons for increased catalytic activity of the investigated system was the formation of fragments with =Al-O-Zn- bonds in these catalysts. In the present study, using model systems, it was shown that, in principle, the formation of these chelated aluminosiloxanes was indeed feasible. Figures 6; references 13: 8 Russian (1 by Western author), 5 Western.
[367-7813]

UDC 541:15:541.128

CATALYSIS ON PRELIMINARY IRRADIATED SOLIDS AND IN IONIZING RADIATION FIELD

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 5, May 84
(manuscript received 10 May 82) pp 1165-1168

MARKEVICH, S. V., Belorussian SSR Academy of Sciences, Institute of Physical and Organic Chemistry, Minsk

[Abstract] A study is made of radiation-catalytic reactions on preliminarily bombarded solids. Industrial aluminosilicate bead catalyst was irradiated by cobalt-60, producing radiation effects at approximately equal concentration whether the beads were heated to 450°C or 800°C before irradiation.

Annealing for 4 hours at 450°C after irradiation decreased defect concentration by two orders of magnitude and produced more symmetrical and stable EPR signals. The catalytic activity of the beads was studied for cracking of cumene and H-D exchange in ethylene. The catalytic activity 1.5 and 2.5 months after irradiation was some 6 times greater than the activity of non-irradiated specimens. Activity was decreased by annealing at 450°C for 4 hours but remained twice as high as the nonirradiated specimens. It is concluded that both thermal and cold or radiation activation cause the same effect. The accumulation of paramagnetic centers in porous glass increases up to a dose of about 35 Mrad of gamma radiation, then reaches a threshold. Figure 1; references 10: Russian.

UDC 541.15:665.2.097.3

INFLUENCE OF GAMMA RADIATION IN PROCESS OF ALUMINOSILICATE CATALYST SYNTHESIS ON ITS ACTIVITY

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 5, May 84 pp 1205-1207

SARAFANOVA, M. P., KAZANSKAYA, A. S. and PANCHENKOV, G. M., (deceased),
Moscow Institute of Petrochemical and Gas Industry imeni I. M. Gubkin

[Abstract] This work was intended to determine whether gamma radiation provided by cobalt-60 influence the process of formation of the active structure of amorphous aluminosilicate gels. Specimens of aluminosilicates with various contents of aluminum oxide were synthesized in a laboratory by combined precipitation as in the industrial system. The catalyst gel was irradiated in the activation aluminum sulfate solution and in wash waters after completion of sulfate ion removal at a rate of 2.2-9.5 Mrad/ar, total radiation dose 1 to 10 Mrad. The results showed that with increasing total radiation dose there is an increase in the yield of gasoline obtained upon cracking in these specimens, the yield of gas and coke remaining practically constant. Catalytic activity was found to remain constant throughout the term of test experiments, the active centers thus proving to be resistant to the influence of temperature. The studies indicate that the process of formation of the active structure of aluminosilicate catalysts passes through a stage of radical polymerization. Figures 2; references 6: Russian.

[287-6508]

UDC 541.183.03

COMPOSITION OF RHODIUM-RUTHENIUM SKELETAL CATALYSTS AS FUNCTION OF CONDITIONS OF LEACHING OF ALUMINUM

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 4, Apr 84
(manuscript received 5 Oct 82) pp 902-905

GRISHINA, T. M. and NESTERENKO, L. N., Department of Chemistry, Moscow State University imeni M. V. Lomonosov

[Abstract] A study was performed of the composition of skeletal catalysts in a rhodium-ruthenium system as a function of their leaching conditions.

Catalysts were produced by fusing rhodium, ruthenium and their mixtures with aluminum in an arc furnace using a tungsten electrode in an atmosphere of argon. The aluminum alloy was removed by treatment with 10% KOH at room temperature for 24 hours followed by holding in 40% KOH at 90-95°C, producing finely dispersed dark gray powders. The studies showed that the composition of the skeletal catalysts depends not only on the phase composition of the initial alloys, but also their leaching conditions. The chemical and phase composition of the alloys and leaching conditions alter the composition of the residual aluminum, the total content of which in the final catalysts is not over 7% by mass. The presence of silicon in the specimens is explained by the high temperature stage of leaching, during which a certain quantity is dissolved from the glass. Figures 2; references 9: 7 Russian, 2 Western. [271-6508]

UDC 541.183

STUDYING INTERACTION OF HYDROGEN WITH NICKEL CATALYSTS BY THERMAL DESORPTION

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 4, Apr 84
(manuscript received 24 Aug 82) pp 947-950

BABENKOVA, L. V. and BLAGOVESHCHENSKAYA, I. N., Institute of Organic Catalysis and Electrochemistry, Kazakh SSR Academy of Sciences, Alma-Ata

[Abstract] The method of thermal desorption is used to study the adsorption of hydrogen on Ni-black and Ni/SiO₂ catalysts. It was found that in the 373-573K temperature interval the total quantity of hydrogen in the nickel black increases due to its dissolution in the volume of the metal and redistribution of the molecular and atomic forms of hydrogen, possibly due to breaking of H-H bonds in H₂ molecules at elevated temperature. Comparison of thermal desorption data for nickel black and Ni/SiO₂ shows that after treatment at temperatures assuring full reduction of the metal, the total content of adsorbed hydrogen increases with increasing temperature due to increasing quantities of atomic-adsorbed and dissolved hydrogen. The content of various forms of chemisorbed hydrogen in Ni-black and Ni/SiO₂ is determined by the degree of reduction of the metal in the catalyst. In fully reduced specimens, increasing temperature causes an increase in the content of the atomic form of hydrogen and facilitates the dissolution of hydrogen in the metal. In specimens containing oxides of nickel increasing treatment temperature leads to a decrease in the content of firmly bonded hydrogen. Figures 2; references 20: 18 Russian, 2 Western. [271-6508]

GROUP VI METALS AS HIGH HYDROGEN PRESSURE HYDROGENATION CATALYSTS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 4, Apr 84
(manuscript received 10 Jan 83) pp 990-991

SOKOL'SKIY, D. V. and UALIKHANOVA, A., Institute of Organic Catalysis and Electrochemistry, Kazakh SSR Academy of Sciences, Alma-Ata

[Abstract] A study is made of the reaction of hydrogenation of phenylacetylene in the presence of 50% Me-MgO catalyst (where Me is Cr, Co or W). The catalytic activity of Mo-MgO under comparable conditions is almost an order of magnitude higher than W-MgO and 4 times greater than Cr-MgO. On all catalysts the reaction is nonselective.

[271-6508]

OXIDATION OF METHANOL ON SILVER CATALYSTS WITH IMPURITIES PRESENT

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 4, Apr 84
(manuscript received 9 Oct 82) pp 1015-1016

FILICHEVA, O. D. and KURINA, L. N., Tomsk State University imen V. V. Kuybyshev

[Abstract] A study was made of the significance of acrolein and methylformiate in a process of oxidation of methanol on a silver catalyst. Studies were performed on a continuous-flow laboratory installation in a quartz glass reactor containing a pumice-silver catalyst, with silver 37% of the mass of the carrier. Impurities were added to the initial methanol containing 30% water immediately before the beginning of the experiment at 0.25 to 4% of the mass of the methanol. Studies were performed at 773-923K; the composition of exhaust gases was analyzed chromatographically, formaldehyde determined by the sulfite method. The presence of acrolein in methanol leads to deterioration of the results of the main process: an increase in the quantity of CO and CO₂ in the reaction product, a decrease in the yield of CH₂O. This is explained in two ways: the larger molecules of acrolein hinder access of CH₃OH to the surface of the catalyst, and the process of carbon deposition is strengthened. Figure 1; references 9: Russian.

[271-6508]

THERMAL PROGRAMMING OF HYDROGEN DESORPTION FROM SURFACE OF PROMOTED PLATINUM CATALYSTS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 4, Apr 84
(manuscript received 10 Oct 82) pp 1016-1018

DEMENKOVA, Ye. P. and FOMICHEV, Yu. V., Kuybyshev Polytechnic Institute imeni V. V. Kuybyshev

[Abstract] A study is presented of the interaction of hydrogen with the surface of applied aluminum-platinum catalysts containing certain additives by the method of thermal programmed desorption of hydrogen. Catalysts contained Pt, Re, Pt+Re, Sn and Pt+Sn. To determine the influence of rhenium and tin on the nature and quantity of hydrogen desorbed, spectra were obtained from catalyst specimens containing no platinum. The data indicate that desorption spectra of hydrogen from the surface of promoted platinum reforming catalysts cannot be interpreted as additive. It is characteristic that in contrast to the rhenium catalyst, a tin catalyst with no platinum does not chemisorb hydrogen under the conditions studied. However, a platinum-tin catalyst shows a significant increase in quantity of chemisorbed hydrogen in comparison to the platinum catalyst, which may be explained by the dispersing influence of the additive on the platinum, as well as the silver phenomenon, in which surface diffusion causes transfer of hydrogen activated on the platinum to the promoted tin carrier which acts as a hydrogen acceptor. Figures 2; references 4: Western.
[271-6508]

VAPOR PHASE ISOMERIZATION OF CYCLOHEXANONEOXIME TO ϵ -CAPROLACTAM ON BIZEOLITE-CONTAINING CATALYSTS

Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 28, No 7, Jul 84
(manuscript received 3 Oct 83) pp 628-631

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[Abstract] A study is presented of the activity of bizeolite catalysts containing decationized type Y-zeolites, Ferrierite and LaHY in the aluminosilicate matrix in vapor-phase isomerization of cyclohexanoneoxime to ϵ -caprolactam. The catalytic activity of the catalysts synthesized in isomerization of cyclohexanoneoxime was studied in a flow-through installation at atmospheric pressure with a stationary 10 cubic centimeter catalyst layer with cyclohexanoneoxime fed in as a 17% solution in toluene. The reaction products

were analyzed chromatographically. The studies performed showed that decationized and La-decationized zeolite can be used to obtain bizeolite isomerization catalysts which are equal in their activity to other zeolite-containing catalysts but are more stable in operation. References 11: Russian. [333-6508]

UDC 541.128

ACTIVITY AND DISPERSION OF PALLADIUM IN ALUMINOPALLADIUM CATALYST

Minsk IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK in Russian No 3, May-Jun 84 (manuscript received 14 Sep 83) pp 12-14

KRAVCHUK, L. S., KOZLOV, N. S., IVASHCHENKO, N. I., SINYAKOVA, S. V. and ZHIZHENKO, G. A., Institute of Physical-Organic Chemistry, Belorussian SSR Academy of Sciences

[Abstract] A study is presented of the relationship between dispersion of palladium and its activity in the reaction of hydrogenation of benzene. The study was performed on catalysts obtained by saturating gamma-Al₂O₃ with an aqueous solution of palladium nitrate. Specimens were dried, heated at 500°C three hours in air. Palladium content was 0.1 to 1.0 mass %. The metal is located on the outer surface of the granules of the carrier as a thin film, significantly decreasing the diffusion effect. Data on activity correlate well with dispersion of Pd. Specific catalytic activity decreases somewhat with an increase in the content of metal to 0.5-0.6 mass %, then varies little with further increases to 1.0 mass %. Palladium particles with mean diameter about 30 Å are optimal for hydrogenation of benzene. Figures 2; references 7: 4 Russian, 3 Western. [325-6508]

UDC 541.128+541.183

DETERMINATION OF SURFACE OF METALLIC COPPER IN COPPER-MAGNESIUM CATALYSTS OF VARIOUS COMPOSITIONS

Minsk IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK in Russian No 3, May-Jun 84 (manuscript received 10 Aug 83) pp 17-20

SIDEL'TSEVA, M. A. and YEROFYEV, B. V., Institute of Physical-Organic Chemistry, Belorussian SSR Academy of Sciences

[Abstract] Data are presented on the determination of surface and dispersion of copper in Cu-MgO catalyst specimens by selective chemisorption of oxygen. The catalysts studied were prepared by saturation of magnesium oxide with a solution of copper nitrate. Calculated copper content was 5, 10, 20 and 30 mass %. The specimens after saturation were dried and heated in air at 350°C

for 6 hours. It is shown to be possible to use the method of measuring rapid adsorption of oxygen at about 1 mm pressure and 20°C to estimate the surface of copper in CuMgO catalysts. It is also found that when large quantities of copper are introduced to catalysts, the dispersion of the copper decreases significantly. The contribution of copper surface to the total catalyst surface increases up to a certain concentration of metal (about 20 mass %). Above this concentration, specific surface may be related to the presence of copper oxides, the specific surface of which is higher than that of the reduced metal. Figures 3; references 14: 12 Russian, 2 Western.
[325-6508]

UDC 541.128.13

THERMAL TRANSFORMATION IN PRODUCTION OF SINTERED IRON-COBALT AMMONIA SYNTHESIS CATALYSTS

Minsk IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK in Russian No 3, May-Jun 84 (manuscript received 8 Aug 83) pp 20-24

KOMAROV, V. S., ROZIN, A. T., LEMESHONOK, G. S. and YEREMENKO, S. I., Institute of General and Inorganic Chemistry, Belorussian SSR Academy of Sciences

[Abstract] A study is presented of the processes occurring upon high temperature sintering of the components of iron-cobalt catalysts and the influence of the degree of oxidation of the initial iron oxide on these processes. The studies involved x-ray phase analysis and thermography, allowing judgement to be made on the transformations of the substances at high temperature. Under the conditions used for sintering of iron oxide powders in air with continuous temperature rise, magnetite begins to oxidize above 400°C and is completely converted to hematite at about 1200°C. The reverse transformation to magnetite occurs at higher temperatures. The data obtained indicate higher reactivity of hematite than magnetite in the process of sintering of iron-cobalt catalyst promoted with magnesium oxide. When fused iron-cobalt catalysts are formed, the form of the initial iron oxide has no influence on the properties of the end products assuming identical melt cooling conditions. Figures 2; references 6: Russian.
[325-6508]

UDC 547.217.9:542.943.7

OXIDATION OF PENTADECANE IN PRESENCE OF BINARY CATALYSTS BASED ON METAL STEARATES

Minsk IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK in Russian No 3, May-Jun 84 (manuscript received 8 Dec 83) pp 28-31

KOSMACHEVA, T. G., FEDORISHCHEVA, M. N., AGABEKOV, V. Ye. and MITSKEVICH, N. I., Institute of Physical-Organic Chemistry, Belorussian SSR Academy of Sciences,

[Abstract] A study is made of the effect of binary catalytic systems based on the stearates of chromium, lead, magnesium and cobalt on the formation of

end products (ketones and acids) in oxidative transformation of pentadecane. Oxidation of pentadecane was performed in a circulating installation at 383-403 K to a depth of 0.5 M absorbed oxygen, such that primarily pentadecanones are formed. The addition of chromium, lead and magnesium stearates significantly increases the rate of oxidative transformation of pentadecane. The catalytic activity of the additives studied depends on their concentration and temperature. The content of MgSt_2 [stearate] in the binary chrome-magnesium system has a significant influence on the oxidation of pentadecane. When chrome-lead catalyst is used a change in overall concentration of catalysts also influences the selectivity of the yield of end products. A binary chrome-cobalt catalyst (9:1) has less activity than chrome-magnesium or chrome-lead catalysts of the same concentrations. The chrome-lead catalyst is most selective in terms of end products produced. Figure 1; references 4: Russian.
[325-6508]

UDC 541.128

ACTIVITY OF NICKEL CATALYSTS OBTAINED FROM Ni_2Al_3 INTERMETALLIDE

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNLOGIYA in Russian Vol 27, No 6, Jun 84 (manuscript received 2 Jan 82) pp 673-675

NISHCHENKOVA, L. G., TIMOFEYEVA, V. F., GOSTIKIN, V. P. and FASMAN, A. B., Department of Physical Chemistry, Ivanovo Institute of Chemical Technology; Kazakh State University imeni S. M. Kirov; Institute of Organic Catalysis and Electrochemistry, Kazakh SSR Academy of Sciences

[Abstract] The intermetallide Ni_2Al_3 was prepared in an induction furnace in graphite crucibles. Homogenization annealing was performed at 1273K. The alloy was crushed fine and fractionated in an air separator to produce particles from 4 to 24 μm in diameter. Additional boiling alkali treatment was used to reduce the aluminum content from 12-14 to 5.5-6%. This decreases the specific surface and porosity as a result of high temperature sintering of the catalyst. The rates of model reactions were determined for the catalyst obtained by the standard method as well as catalysts produced under optimal conditions and the values of rate constants and degree of utilization of catalyst surface were calculated. The data obtained show that the change in pore structure of the catalyst results in an increase in the degree of utilization of its surface due to the increased effective diffusion coefficient. The activity of nickel catalyst obtained from NiAl_3 , Ni_2Al_3 and alloys with broad variation of nickel content with aluminum was found to be identical. Figures 2; references 9: Russian.
[339-6508]

SOME REGULARITIES OF HETEROGENEOUS CATALYTIC OXIDATION OF CARBON MONOXIDE
ON METAL CATALYSTS

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR in Russian No 6, Jun 84
(manuscript received 3 Oct 83) pp 40-42

OSTAPYUK, V. A., BOLDYREVA, N. A. and KORNEYCHUK, G. P., Institute of Physical
Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] A study is made of the catalytic properties of a number of transition metals in the reaction of oxidation of CO. Nonporous catalytic specimens were used to eliminate the influence of internal diffusion inhibition. The activity of platinum, palladium and chromium was related to their geometric surface. To avoid oxidation of the metals a reaction mixture was used which contained an excess of carbon monoxide. The results obtained confirm the conclusion that the reaction order of catalytic oxidation varies as a function of oxygen-surface bond energy. Critical values and hysteresis effects in the reaction are determined. One possible mechanism meeting requirements for development of several steady states is reported. Figures 2; references 6: 5 Russian, 1 Western.
[337-6508]

CHEMICAL INDUSTRY

TRENDS IN GEORGIAN CHEMICAL INDUSTRY

Tbilisi ZARYA VOSTOKA in Russian 10 Jul 84 p 2

[Article "The Chemical Complex of the Republic" by Georgiy Tsitsishvili, academician-secretary of the Georgian Academy of Sciences, Chemistry and Chemical Technology Division, director of the Georgian Academy of Sciences Institute of Physical and Organic Chemistry and academician of the Georgian Academy of Sciences and Avtandil Dolidze, deputy director of the Institute for Scientific Work and candidate of chemical sciences]

[Text] Technological retrofitting is faced by all branches of the Georgian SSR chemical complex; this is in conjunction with the progressive technology and mastery of managerial and planning methods.

The solution of the sizeable problems, put forth by the June and December (1983) CPSU CC Plenums, the CPSU CC resolution "On the work of the Georgian Communist Party CC for completing the system of management, raising the level of economic work and the rational use of resources", and the extraordinary February CPSU CC Plenum, is impossible without the development of the chemical complex which supports the production of many kinds of products. Applicable to our republic are mineral fertilizers, chemical fibers, products of mining and conventional chemistry, oil refining, rubber-technical products, colored varnish materials, potassium permanganate, electrical manganese dioxide, medicinal preparations, etc.

In agreement with the developed Complex program of the USSR scientific-technical progress for the years 1986-2005 in Georgia, special attention will be devoted to the growth of economic efficiency of chemical production facilities up to the level of the average union indicators and higher.

For satisfying the demands of the republic and increasing its chemical potential, construction is necessary of several quickly repaid and small tonnage production facilities for the production of deficit materials and preparations with the use of the resources of local raw materials and wasteproducts of production. In several cases the importation of several products from other republics is possible.

In evaluating the contemporary condition of the branches of the chemical complex it is necessary to note that the industrial branches in the republic are developing at an advanced pace. The coefficient of their advancement in comparison with the development of the industry of the republic as a whole for the period 1960-1980 is 1.8. The share of the products of the branches of the chemical complex for the entire volume of industrial production has increased.

At the February CPSU CC Plenum the demand for the necessity of rapid introduction of the achievements of science and technology into production facilities and of the operationalization of large complex programs was put forth with special emphasis. New sizeable problems were presented before the branches of the Georgian SSR chemical complex which agreed with the Complex Program of NTP (Scientific-Technical Progress) for the years 1986-2005. So, besides putting large single production capacities into operation for the production of synthetic ammonia and electrical manganese dioxide, there are needed a new progressive technology for the production of polypropylene binding twine for hay baling machines, a fiber with an antistatic effect, a baryto-calcium concentrate, natural zeolite for animal feed, the preparation "KEIM" a means of protecting citrus fruits from harmful insects, and others.

The basic task of the branches of the chemical complex of the republic in the future is the strengthening of their role in the general union division of labor not only with the goal of satisfying intrarepublican demands in separate types of chemical products, but also in the export of several types to other economic regions and countries and shipments for export. Besides the development of the production of nitrogen fertilizers, the putting into maximum industrial production of other types of fertilizers: potassium, phosphate, organic, peat, and fertilizers based on agricultural wastes, etc., are forthcoming.

The production of chemical methods for the protection of plants is being set up at the present time in the chemical enterprises of the republic. With the purpose of satisfying the demands of agriculture of the republic the production of concentrated mineral oils, copper sulfate, colloidal sulfure, chelate preparations, the latter helps to increase plant resistance to diseases. The use of these preparations in agriculture in the republic over the course of many years will give positive results. In connection with this it is necessary to accelerate the solution of the question of financing the construction of production facilities for chelate preparations for hundreds of tons per year so that the demand of the republic will be fully met. It would be expedient to begin the construction at the end of the current Five-Year Plan with the idea of finishing it and putting it into operation within 2-3 years.

At the present time, Georgian SSR agriculture for the most part uses imported chemical means for protecting plants. Apparently it is necessary to be concerned about the further improvement of scientific research in the direction of the creation of original preparations based on local conditions.

The basic part of pesticides in the future must be brought in from beyond the borders of the republic. But, if in the future it will become expedient to meet the demand of the republic for several pesticides on the basis of local industry, then here it will be possible to use the capabilities of our chemical factories with success.

The production of chemical fiber and threads is an important aspect of the chemical branch. It must be based on the growth of the capacities for the production of technical cord which is used in the production of tires. In connection with this it would be expedient to organize in Georgia tire production for the needs of the Kutayisi automobile plant, a plant of small size tractors which is under construction, and other enterprises of the republic. The indicated production may be formed in the facilities of the Kutayisi plant of rubber-technical goods where they produce basic materials which are necessary for the production of tires (with the exception of synthetic rubbers, which may be imported from Azerbaijan SSR).

The use of Tkubul'skiy rhabdopissite (liptobiolite) coal is an important economic task, since rhabdopissite is necessary not only for the production of deficit masses, but also for obtaining very valuable ion exchanging resins, additives, resins, tropic-proof additives for synthetic materials and lubricants, high quality laminated plastics of the hetonax type, etc.

In the Georgian SSR there is a real possibility for the development of a silica-organic industry. This is dictated by the demands of the republic's economy, in particular by the development of the electrotechnical, metallurgical, rubber-technical, food, light and consumer branches of industry. Existing natural resources will permit the organization of production of silica-organic monomers and polymers.

Great plans promise the development of the organic synthesis industry. Here, in the first place, it is necessary to broaden the sizes of the production of caprolactan at the Rustavi Production Association "Azot".

It is necessary to expand the production scales of carbamide for use as an initial raw material for obtaining carbamidine-formaldehyde resins and a series of medicines of the barbituate family and other physiologically active substances.

At the present time there is an ever growing tendency for the use of coal and natural gas as the most important types of raw material for the chemical industry. Georgia needs the creation of a small ton production facility on the basis of acetylene with the use of the accomplishments of Soviet, including Georgian, scientists in the field of the chemistry of acetylene.

We will do not have in the republic a scientific-production association of the organic field. Meanwhile there is a need for its creation.

The chemical industry is closely connected with the medicine industry which cannot yet meet the demand in health care for the extremely important steroids hormone preparations. This has occurred because of the lack of raw materials for their synthesis. The use for this purpose by republic scientists of the suggested new raw material--tigogenene will save tens of millions of rubles per year. Tigogenene is already produced at the experimental equipment of the Batumi Chemical Pharmaceutical Plant.

The raw material base of the microbiology industry of the republic is in need of the organization of the production of liquid paraffins.

It is planned to increase the extraction and production of clinoptilolite rock up to several tens of thousands of tons annually. Special attention will be devoted to the quality of zeolites. The production of a different assortment of clinoptilolite products, which in the future will be used in different branches of the economy, is foreseen. Depending on the purpose of the product, clinoptilolite, containing powders of different sizes (fractions) will be produced.

Besides the production of natural undeveloped clinoptilolite-containing ores, it is very important to adjust production for enriched ores as well as modified zeolites.

The future development will include the production of goods of actual chemistry as a result of the modernization of equipment and the renewing of the nomenclature with primary use of the plant and mineral resources of the republic.

The future developments of the branches of the Georgian SSR chemical complex to the year 2005 are very grand, but a precise guiding line for the future will make it possible to raise significantly the contribution of the republic's chemical complex to the general union coffers, and to accelerate the development of many other branches of the economy.

12596

CSO: 1841/329

MAJOR TRENDS IN STUDY OF PROCESSES IN LIQUID CRYOGENIC SYSTEMS

Moscow KHIMICHESKOYE I NEFTYANNOYE MASHINOSTROYENIYE in Russian No 7, Jul 84
pp 5-6

FILIN, N. V., doctor of technical sciences, DOMASHENKO, A. M., candidate of technical sciences and BULANOV, A. B., candidate of technical sciences

[Abstract] During the past 25 years, cryogenic engineering has developed as a science related to the creation of liquid cryogenic systems. The general principles of design of the parameters, development of systems and technology of operation of such systems have significant new features resulting from the specifics of cryogenic products. The study of heat and mass transfer in cooling and filling of equipment with liquid product has been a major aspect of this science. Reliability and effectiveness of operation of cryogenic filling systems are largely determined by the hydro-dynamic and thermal specifics of the processes of storage and transportation of such fluids. The creation of liquid cryoproduct storage containers of up to 1400 m³ and the use of such fluids at sea have required studies of processes occurring in case of accidental loss of seal in such systems. The study of processes heat and mass transfer during cooling of cryoproducts has been related primarily to the requirements for improvement of characteristics of storage systems. Analysis of failures and problems arising during operation of cryogenic systems shows that in many cases they result from an intensive dynamic load appearing in the system during transitional operating stages. References 8: Russian. [344-6508]

MANUFACTURE OF SPHERICAL ISOTHERMAL RESERVOIRS FOR STORAGE OF CRYOGENIC PRODUCTS

Moscow KHIMICHESKOYE I NEFTYANNOYE MASHINOSTROYENIYE in Russian No 7, Jul 84
pp 6-7

BELORUSETS, B. O., DUDKIN, I. Ye., ZHELEZNYAKOV, V. K., engineers, KURANOV, B. A., doctor of technical sciences and STEPANOV, G. A., candidate of technical sciences

[Abstract] The Scientific Production Association "Krigonmash" imeni 40th Anniversary of October has performed research on the creation of two-stage isothermal spherical reservoirs for the storage of cryogenic products. The research and development activities have allowed determination of the capabilities of metals for long term operation at low temperatures, estimation of the stress in the shell of the inner vessel under static, dynamic and temperature load, as well as the stress in the supporting system of the reservoir. This work has served as the basis for development of methods of designing spherical reservoir shells for strength. The reservoir consists of an internal vessel, outer shell, supporting structures, shielding vacuum insulation and adsorption pumps. A diagram of a typical vessel with a cryo-product storage capacity of 1437 cubic meters is presented. These vessels are said to be in series production. Figure 1.
[344-6508]

UDC 621.59.048

NEW CRYOGENIC STORAGE AND GASIFICATION SYSTEM EVAPORATORS

Moscow KHIMICHESKOYE I NEFTYANNOYE MASHINOSTROYENIYE in Russian No 7, Jul 84
pp 7-8

ORLOV, V. K., POZNYAK, V. Ye. and KUZ'MENKO, G. P., candidates of technical sciences

[Abstract] The Scientific Production Association "Krigonmash" imeni the 40th Anniversary of October has suggested heat exchange elements with internal finning of pipes with corrugated discontinuous packing with checkerboard rib placement to intensify the process of heat exchange or film boiling of cryogenic fluids. A table presents the results of testing vapor-generating channels 1990 mm in length with inside diameter 28 mm using various devices for intensifying heat exchange. Heat exchange intensity was found to increase with corrugated packing placed tightly against the inner surface of the pipes. The new apparatus, featured in the front cover photograph of this journal, is small, consuming approximately one tenth the metal of old design evaporators of the same capacity. Calculations using new formulas which have been developed

indicate that means of improving heat exchange elements include decreasing thermal resistance of the contact between the heat transmitting packing and the inner surface of the pipe. Figures 2; references 4: Russian. [344-6508]

UDC 536.24:661.939.1

STUDY OF PROCESSES OF HEAT TRANSFER TO HELIUM-II

Moscow KHIMICHESKOYE I NEFTYANNOYE MASHINOSTROYENIYE in Russian No 7, Jul 84 pp 10-12

BELYAKOV, V. P., corresponding member, USSR Academy of Sciences, VOLKOVA, N. M., engineer and SHAPOSHNIKOV, V. A., candidate of technical sciences

[Abstract] In order to derive calculation equations for planning of cryogenic systems utilizing He-II, the Scientific Production Association "Kriogenmash" imeni 40th Anniversary of October undertook studies of heat transfer to He-II in large volume at atmospheric and equilibrium pressures in models of various types and the influence on heat transfer of non-uniform thermal load input to the walls of the heat transfer channel. The maximum heat flux corresponds to the transition of He-II to He-I at some point in the channel, a cylindrical element 7.4 mm in diameter and 10.5 mm in length made of ceramic with a layer of metal several micrometers thick on its surface. An equation is presented which can calculate the temperature of He-II in the channel with little error, which can be used to determine the wall temperature up to the maximum possible heat flux density. This was experimentally verified for all cross sections of channels studied at a pressure of about 10^5 Pa. Figures 5; references 3: 1 Russian, 2 Western. [344-6508]

UDC 66.074.7-973 661.183.6

STUDY OF LOW TEMPERATURE SHORT-CYCLE SORPTION SEPARATION OF AIR

Moscow KHIMICHESKOYE I NEFTYANNOYE MASHINOSTROYENIYE in Russian No 7, Jul 84 pp 12-14

FEDOSETEVA, N. A., candidate of technical sciences, ARKHAROV, A. M., doctor of technical sciences and SERPINSKIY, V. V., doctor of chemical sciences

[Abstract] An experimental study was performed of the process of dynamic adsorption of oxygen from the air in order to determine effective conditions for low temperature sorption separation of air to produce oxygen-rich products. A special laboratory test stand was used to study the process of sorption separation of air on zeolite in the pressure range 0.1-0.4 MPa, temperature 77-300K using NaA-6 zeolite. During the experiment the quantity and purity

of products produced were determined as a function of the major technological parameters: temperature and pressure of adsorption, time, and consumption of gas mixture. Each parameter was varied individually. It was found that the maximum oxygen concentration in the product is achieved during the first few seconds of desorption, during which time most of the product is removed. The effectiveness of adsorption separation is influenced by the flow rate of incoming air. The calculated energy cost of the process was 0.5-0.9 kW·hr/kg O₂. Energy costs can be reduced to 0.3-0.5 kW·hr/kg O₂ by blowing pure oxygen through the adsorber before beginning desorption. Figures 4; references 3: 2 Russian, 1 Western.
[344-6508]

UDC 621.651-987:621.036

NEW SERIES OF HIGH PRESSURE PUMPS FOR CRYOGENIC FLUIDS

Moscow KHIMICHESKOYE I NEFTYANNOYE MASHINOSTROYENIYE in Russian No 7, Jul 84
pp 14-15

BRAUN, V. M., candidate of technical sciences and BRAILOVSKIY, Ya. L.,
GALITSAN, L. I., PAVLENKO, Yu. A. and SHUL'GIN, P. F., engineers

[Abstract] The Scientific Production Association "Kislородmash" has developed a new series of pumps in two modifications: with smooth delivery regulation by changing of piston stroke for air separating installations and with stepped regulation by the use of multispeed electric motor for gasification installations. The maximum piston stroke is 30 mm for both of the new devices. A test stand was used to measure the working characteristics of pumps with bores of 16, 20, 25 and 32 mm, piston stroke 15 to 30 mm, rotating speed 4.7-9.4 s⁻¹, delivery pressure 5-40 MPa, cooling at intake 3-10 K for pumping nitrogen. The design of the pumps allows a single mechanism to be used to create two and three line machines. Introduction of the new series of pumps will achieve a significant savings in nonferrous and ferrous metals as well as manufacturing labor. Figures 2; references 3: Russian.
[344-6508]

UDC 533.581

VACUUM CRYOGENIC PUMPS BASED ON INDEPENDENT MICROCRYOGENIC SYSTEMS

Moscow KHIMICHESKOYE I NEFTYANNOYE MASHINOSTROYENIYE in Russian No 7, Jul 84
pp 15-16

SHEYN, L. L., candidate of technical sciences, GROMOV, A. V., engineer and
GREZIN, A. K., candidate of technical sciences

[Abstract] The Scientific Production Association "Mikrokriogenmash" has created a series of high vacuum cryopumps based on independent micro-cryogenic systems operating in a low temperature heat pump cycle and gas cryogenic

machine cycle. The NVK-0.6A-R1 and NVK-1A-R1 cryopumps contain a cryogenic evacuation pump with built-in cooler connected by a flexible hose and electric cable to a compressor installation. In the NVK-1A-G1 pump the cryogenic evacuation unit is structurally combined with the cryogenic machine, decreasing mass and size of the entire installation. The pumps have been thoroughly tested with air, hydrogen and helium, indicated that variations in intake pressure in the range of 10^{-1} -30 Pa for the NVK-1A-R1 and 10^{-1} -5 Pa for the NVK-0.6A-R1 have practically no influence on the time required for the pump to reach its operating mode. The studies also showed that the capacity for pumping condensed gases such as air is much greater than noncondensed hydrogen and helium, due to the relatively low suction capacity of SKT-4 adsorbent and low speed of diffusion of the gases in the mass of the adsorbent. Figure 1. [344-6508]

UDC 621.6.036-973.001.5

STUDIES OF NITROGEN-FREON MIXTURE ENTHALPY

Moscow KHIMICHESKOYE I NEFTYANNOYE MASHINOSTROYENIYE in Russian No 7, Jul 84 pp 16-18

ANIKEYEV, G. N., MIFTAKHOV, R. M., TROFIKOVA, O. S., engineers, and ZAKHAROV, N. D., candidate of technical sciences

[Abstract] To measure the enthalpy of nitrogen-freon mixtures, the authors used a modified flow-through choke-calorimeter method with a choke cooling unit to reduce the temperature of the mixtures, finned coils equipped with choking devices with constant and regulated cross sections at the ends and a second stage evaporator consisting of a copper cup and coil. The equations derived in the article produced calculated results for nitrogen plus freon-13 which did not vary from experimental results by more than 50 J/mol in the 170-260 K temperature range, by an average of 140 J/mol at temperatures below 140 K. This agreement is judged satisfactory. Figures 2; references 9: 7 Russian, 2 Western. [344-6508]

UDC 66.074.4 621.6.036

ADSORPTION METHODS OF PURIFYING AIR AND ITS SEPARATION PRODUCTS

Moscow KHIMICHESKOYE I NEFTYANNOYE MASHINOSTROYENIYE in Russian No 7, Jul 84 pp 18-20

VAGIN, Ye. V., doctor of technical sciences, (deceased) and PETUKHOV, S. S., candidate of technical sciences

[Abstract] During condensation purification of cryogenic gases, the minimum residual concentration of impurity depends on its vapor tension at the assigned temperature. In adsorption purification of a gas stream the natural distribution

of vapor-forming impurities between the vapor and condensed phases is significantly changed by the adsorbent. Adsorption purification can therefore decrease the residual content of impurities to an arbitrarily low level by reducing the gas load on the adsorbent. A second significant advantage of adsorption processes over condensation for gas purification is the possibility of their performance at higher temperatures, significantly greater than the condensation temperature for the impurity being removed. All adsorption processes currently used in cryogenic technology are batch processes. When combined with condensation processes, adsorption methods can achieve the greatest presently known efficiency. References 9: Russian.
[344-6508]

UDC 66.021.3

INTENSIFICATION OF MASS TRANSFER IN GAS-LIQUID SYSTEMS UPON INTRODUCTION OF FINELY DISPERSED SOLID PHASE

Moscow KHIMICHESKOYE I NEFTYANNOYE MASHINOSTROYENIYE In Russian No 7, Jul 84
pp 24-25

BARKAR, L. I., candidate of technical sciences and NIKOLAYEV, N. A., doctor of technical sciences

[Abstract] The authors have studied mass transfer when an inert finely dispersed solid phase is introduced to a gas-liquid system on the example of adsorption of carbon dioxide from air by an aqueous solution of NaOH. Studies were performed on an experimental column operating with ascending bubbling of the gas phase through the liquid phase containing the solid phase. The results of the study showed that the maximum value of α is achieved with a content in the solution of some 2.5 vol. % of the finely dispersed solid phase, at which point α is approximately double the extraction of CO₂ by the alkali solution without the solid phase. Figure 1; references 4: Russian.
[344-6508]

UDC 62-192"401.7" 621.891-621.867-233.2

INCREASING DURABILITY AND RELIABILITY OF OPERATION OF FRICTION UNITS IN CHEMICAL PRODUCT CONVEYORS

Moscow KHIMICHESKOYE I NEFTYANNOYE MASHINOSTROYENIYE In Russian No 7, Jul 84
pp 34-35

KOROTENKO, N. D., engineer, GOROKH, A. P., candidate of technical sciences and TROFIMOVICH, A. N., doctor of technical sciences

[Abstract] In order to develop materials based on thermoplastic polyurethanes, the antifriction characteristics of composites consisting of thermoplastic

polyurethane plus 5-40 mass % graphite were studied. Tests were performed in friction with type 45 steel (HRC48-50). The wear rate was determined gravimetrically. The data indicated that introduction of graphite had a positive influence on the antifriction properties of polyurethanes. The optimal graphite content was 15-25 mass %, at which point the coefficient of friction of the composition was decreased by a factor of 2, wear resistance of the materials increased by a factor of 3 to 7. Introducing the graphite had a significant influence on physical and mechanical properties: tensile strength decreased by 30 to 40%, hardness increased. Introduction of up to 5% graphite has no significant influence on antifriction properties, while over 25 mass % graphite increases wear rate and coefficient of friction, as a result of decreasing strength. References 4: Russian.
[344-6508]

UDC 66.091.023-034.14

STRUCTURAL MATERIALS FOR REACTION EQUIPMENT USED IN SYNTHESIS OF ACETALDEHYDE AND PROPYLENE OXIDE

Moscow KHIMICHESKOYE I NEFTYANNOYE MASHINOSTROYENIYE in Russian No 7, Jul 84
pp 35-36

ZARITSKIY, V.-I. D., engineer and MULYAVA, M. P., candidate of chemical sciences

[Abstract] The authors studied the corrosion resistance, influence on stability of synthesis reactions and selectivity of formation of propylene oxide and acetaldehyde for materials used for the manufacture of reaction units: type VSt3 carbon steel, ADO aluminum, AMts aluminum alloy, VT1-0 titanium, 12Kh18M10T and 10Kh17M13M2T austenite steels, as well as low alloy austenite ferrite steels 08Kh22Ntc and 08Kh21N6M2T as delivered, prestressed and welded. The tests showed that under the conditions of synthesis of propylene oxide and acetaldehyde, 12Kh18NT steel is the best for construction of reactors, 10Kh17M13M2T for condensers. The fractional distillation column should be made of VT1-0 titanium or 08Kh21N6M2T or 10Kh17M13M2T steel. References 2: 1 Russian, 1 Western.
[344-6508]

COAL GASIFICATION

UDC 552.57

PARAMAGNETISM AND ASSOCIATIVE INTERACTION OF PRODUCTS OF REDUCTIVE ALKYLATION OF COALS

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 7, Jul 84
(manuscript received 5 Mar 84) pp 36-39

KOCHKANYAN, R. O., ZHDANOV, V. S., NOSYREV, I. Ye., KUZAYEV, A. I. and BARANOV, S. N., corresponding member, UkSSR Academy of Sciences, Institute of Physical-Organic Chemistry and Coal Chemistry, UkSSR Academy of Sciences, Donetsk

[Abstract] It was shown previously that coal can react with alkali metals to form adducts having both anion-radical and metal-complex properties. Under these conditions certain paramagnetic sites (PMS) on the coal are reduced to diamagnetic anions which can then be alkylated. EPR-spectroscopy shows that these PMS consist of several different types and that some of them are charge transfer complexes, as indicated by changes in site concentrations in solvent extracts of reduction-alkylated coals. PMS distribution molecular fraction of these extracts separated by gel-chromatography show that the PMS specific concentration remains constant from the high molecular weight (limit) to about 1500 molecular weight. Figures 2; references 11: 8 Russian, 3 Western. [376-12765]

UDC 662.67

HYDROGENIZATION AND CONVERSION OF BULGARIAN SHALE FROM BOROV DOL DEPOSIT

Tallinn IZVESTIYA AKADEMII NAUK ESTONSKOY SSR: KHIMIYA in Russian Vol 33, No 3, Jul-Aug-Sep 84 (manuscript received 10 Mar 83) pp 141-146

NAPPA, LIA, KLESMENT, I. and VINK, Natal'ya, Institute of Chemistry, Estonian SSR Academy of Sciences

[Abstract] Thermal destruction of fuel shales from Borov Dol deposit in Bulgarian was performed with a sample having the followign composition: 5: CO₂miner-2.4, S_{tot} - 2.3, organic matter 22.0. The atomic H/C radio was high. Autoclave experiments were performed by a method described in an

earlier work. The lowest yield of tar was achieved by semicoking (28%). When alkali is added, the yield reaches 43%. Hydrogenization in an aqueous solution of sodium formate increases the yield to 49%. The highest yield is obtained by catalytic hydrogenization in a medium of cyclohexane. The group composition of tar was calculated considering the quantity of paraffin liberated by carbamide and the group composition of the deparaffinized resin. Chromatographic analysis shows that long-chain n-paraffins consist of C_9 to C_{30} . A high content of paraffin in thermal destruction tars with relatively low yield of semicoking tars is characteristic for this deposit. Figures 3; references 10: 7 Russian, 3 Western.
[363-6508]

UDC 665.7.032.57:66.094.3:543.54:621.384.8

COMPOSITION OF VOLATILE PRODUCTS FORMED UPON OXIDATION OF KUKERSITE KEROGEN

Tallinn IZVESTIYA AKADEMII NAUK ESTONSKOY SSR: KHIMIYA in Russian Vol 33, No 3, Jul-Aug-Sep 84 (manuscript received 21 Mar 83) pp 147-154

BONDAR', Yevgeniya and VESKI, R., Institute of Chemistry, Estonian SSR Academy of Sciences

[Abstract] The organic products of oxidation of kukersite kerogen are collected in the oxidation units as an oily layer on the surface of the condensate. For a more detailed study of the composition of the oily layer than in previous works, this work preliminarily separated it into fractions which were then analyzed by GLC and chromato-mass-spectrometry. Quantitative analysis of acids and their methyl esters by GLC was performed on a type LKhM8MD model 5 chromatography, of acids by GLC-MS in a Hewlett Packard 5840 A chromatograph with 5895 A mass spectrometer and HP 1000 computer. Results of quantitative analysis are presented. It is established that the organic products carried away by air from the reaction mixture in the production of aliphatic dicarboxylic acids, formed upon oxidation of kukersite kerogen with nitric acid, consist of 72.2% of normal monocarboxylic acids, which determine the raw material qualities of the product in question. Three homologous series of compounds contained in the oily layer in small quantities are identified here for the first time as C_{12} - C_{18} n-alkane-7-ones, C_{15} - C_{32} n-alkanes and methylalkenylcyclohexanes C_nH_{2n-2} (where $n=10-17$). Figures 5; references 19: 13 Russian, 6 Western.
[363-6508]

STUDY OF CHEMICAL RAW MATERIAL QUALITIES OF BULGARIAN FUEL SHALE FROM KRASAVA DEPOSIT, PART 1: GENERAL CHARACTERISTICS OF SHALE AND BITUMOIDS

Tallinn IZVESTIYA AKADEMII NAUK ESTONSKOY SSR: KHIMIYA in Russian Vol 33, No 3, Jul-Aug-Sep 84 (manuscript received 29 Apr 83) pp 155-161

VESKI, R., FOMINA, A., KOKH, Rudolf, TAAL, Hilya, KOKH, Rein, EL'BREKHT, Valentine and REALO, E., Institute of Chemistry, Estonian SSR Academy of Sciences; Institute of Physics, Estonian SSR Academy of Sciences

[Abstract] A general description is presented of a sample of fuel shale from Krasava deposit, its organic and inorganic parts, and data are presented on processing of the initial material with hydrochloric and nitric acids. The fuel shale sample studied was collected by an explosive method in the Eastern Portion of Krasava deposit and the upper 8 meter layer of weathered shale was discarded. The 5 ton sample remaining was then studied. Technical analysis showed it to have an ash content of 63.1% CO_2^C mineral 8.8%, 29.8-31.5% organic matter, depending on test methods. Full chemical analysis was performed by classical quantitative analysis methods, atomic-absorption spectrometry and Mossbauer spectrometry. The mineral portion was found to have carbonate-alumino-silicate composition. The shale differs from other Krasava deposit shale samples which have been studied. Inclusions quite rich in organic matter are found. The 80-93% organic inclusions are more aromatic than the organic matter in the remainder of the sample. Figures 3; references 12: Russian.

[363-6508]

UDC 662.749

SPECIFICS OF ORGANIC MATTER IN TUROVSKIY DEPOSIT FUEL SHALES

Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 28, No 7, Jul 84 (manuscript received 8 Jul 83) pp 632-634

LISHTVAN, I. I., academician, Belorussian SSR Academy of Sciences, ZEN'KOV, V. S., GOR'KIY, Yu. I. and MORZAK, G. I., Institute of Peat, Belorussian SSR Academy of Sciences

[Abstract] Fuel shale samples, taken in the western portion of the Turovskiy deposit in the Belorussian SSR, containing 18.2% organic matter, 8.6% resins, 2.0% pyrogenic water, 2.3% semicoke gas and 87.1% semicoke were studied. The mineral component consisted of slightly carbonaceous clay with predominance of hydromica and kaolinite. Inclusions of gypsum, anhydrite, dolomite, quartz, pyrite, autigenous silica and vulcanogenic materials were found. Specimens were screened and thermally destroyed in a current of helium. The gas liberated was chromatographically analyzed. Specimens were taken each 50°C. The yield of gas and resin was found to increase with increasing particle size, reaching 7.09 and 8.62% of the dry shale in the +0.2 mm fraction. The studies showed that the composition of pyrolysis gas indicated that the

organic matter in the large fractions was sapropelic, while the smaller fractions contained humic organic matter. The organic matter in the larger fractions was less thermally stable under the experimental conditions. Figure 1; references 3: Russian.
[333-6508]

UDC 662.667

RADIOGRAPHIC STUDY OF CHANGES IN STRUCTURE OF ANTHRACITES AFTER HEAT TREATMENT IN CURRENT OF NITROGEN

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 6, Jun 84
(manuscript received 1 Feb 84) pp 1210-1213

TATISHCHEV, A. S., YERSHOV, V. A. and SMORODINA, T. P.

[Abstract] A radiographic method was used to study specimens of thermo-anthracite subjected to heat treatment in the 700-1700° temperature range at intervals of 100° with holding times of 1, 5, 10, 15, 20, 25 and 60 minutes. Heat treatment causes orientation of two-dimensionally-ordered crystallites, as is indicated by the presence of maxima which relate to reflections from the base planes with indices (002) and (004) and the appearance of maxima relating to reflections from prismatic planes with indices (100) and (101) characterizing the beginning of formation of a three-dimensionally-ordered structure. The formation of the structure during that treatment of anthracites in a current of nitrogen begins at somewhat lower temperatures and times of isothermal holding, although the general nature of the process is the same. Figures 3; references 10: Russian.
[356-6508]

UDC 552.521

CORRELATION BONDS BETWEEN CHEMICAL ELEMENTS IN DICHTHIONEME SHALES

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 4, Jul-Aug 84 (manuscript received 25 Apr 83) pp 23-27

KHALDNA, Yu. L., PALVADRE, R. Yu., AKHELIK, V. R., KLASS, Ye. G., YUGA, R. Ya., ODINETS, V. M. and KORNYSHEVA, K. N., Institute of Chemistry, Estonian SSR Academy of Sciences

[Abstract] A study is made of the stochastic (correlation) bonds between chemical elements in dictioneme shales from the Estonian SSR. The samples of graptolite shale analyzed were obtained by a method based on the fact that the dictioneme shale is a microheterogeneous material. The method was based on separation of the shale by crushing and grinding, hydraulic cyclone fractionation to separate the heavy pyrite and lighter clay-organic fraction

and flotation. Silicon, aluminum, total iron, calcium and magnesium were determined in the solution obtained after melting a sample with KNaCO_3 . The organic matter was determined from the calcination loss and carbon analysis. The content of microcomponents was determined by atomic absorption analysis. The paired correlation coefficients were calculated between the microcomponents and macrocomponents. It was found that vanadium is primarily bonded with aluminum rather than the organic matter, more weakly bonded with ferrous oxide than molybdenum. The bonding of Mo with FeO has $R=0.94$. This is quite different from the clay shales of Sweden, 600 km distant. Molybdenum is bonded with the organic matter and FeO. Zirconium is bonded with silicon. Cu, Ni and Co are bonded with pyrite sulfur. References 9: Russian. [360-6508]

UDC 662.642.2

RESULTS OF HYDROLYSIS OF FUSINITE BROWN COAL

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 4, Jul-Aug 84
(manuscript received 10 Jul 83) pp 36-40

PEREDNIKOVA, Z. M., RUMYANTSEVA, Z. A., GARTSMAN, B. B. and RAKITINA, Ye. V.,
Institute of Chemistry, Tajik SSR Academy of Sciences

[Abstract] A study is presented of the chemical composition and structure of organic matter in fusinite brown coal by various methods of destruction, including hydrolytic separation. Studies were performed on unweathered and weathered brown coal taken from the B layer of the Shurabskiy deposit of the Tajik SSR and consisting of 92 and 95% fusinite components. It is found that alkaline hydrolysis can dissolve up to 66% of the organic mass of the bituminated weathered fusinite brown coal and up to 25% of the organic mass of bituminated unweathered brown coal. Solvent extraction, chromatography and saponification of carboxylic acid esters separates the products of alkaline hydrolysis of the samples into relatively homogeneous chemical substances which are apparently aliphatic benzene-carboxylic and oxybenzene carboxylic acids as well as long chain normal paraffin hydrocarbons.

References 7: 3 Russian, 4 Western.
[360-6508]

UDC 662.642:661.183.123

BROWN COAL AS NATURAL ELECTRON EXCHANGER

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 4, Jul-Aug 84 (manuscript received 15 Jul 83) pp 41-46

KOSSOV, I. I., ALEKSANDROV, I. V. and KAMNEVA, A. I., Moscow Institute of Chemical Technology imeni D. I. Mendeleev

[Abstract] The objects of this study were brown coal samples from Kharanorskiy and Nazorvskiy deposits. The Kharanorskiy coal has a high tendency toward

spontaneous combustion, while the Kazorvskiy coal is more oxidized. Studies of the electron-ion exchange properties of these samples were performed on the initial specimens as well as processed specimens following benzene extraction, demineralized coal after treatment with 3% HCl, humic acids and residual coal. The work indicates the brown coal can serve as natural electron-ionic exchange substances and shows the need for further work to study the natural reducing capacity of brown coal and its group components, and also to produce electron-ion exchange substances with predetermined properties. References 8: Russian. [360-6508]

UDC 532.73.3-665.452

CONNECTION OF SOLVENT PROPERTIES WITH EXTRACTION CAPABILITY WITH RESPECT TO MENILITE SHALES AND COAL

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 4, Jul-Aug 84 (manuscript received 27 Dec 82) pp 66-72

MAKITRA, R. G., FIL'TS, D. I., PIRIG, Ya. N. and ZHUKOVSKIY, V. Ya., Institute of Geology and Geochemistry of Fuel Shales, Ukrainian SSR Academy of Sciences

[Abstract] An attempt is made to apply a linear polyparametric equation of free energy derived in an earlier work by the same authors to establish the relationship between the yield of extract from solid caustobiolites and solvent properties, i.e., to calculate the distribution of substances between the solid and liquid phases. The substance studied was a specimen of Carpathian menilite shale from the upper Sinevidnoye deposit with carbon content 12%, weight loss upon calcination 26%. The authors assume this to mean 26% organic content, since the shale contains practically no carbonates. It is demonstrated that the principle of linearity of free energies is applicable to the process of extraction of solid caustobiolites and allows the linear 5-parameter equation suggested to yield a satisfactory mathematical relationship between the yield of extract and the properties of the extracting agents, explaining the chemism of the process of extraction and predicting the most effective extraction agents. Figures 4; references 23: 11 Russian, 12 Western. [360-6508]

SUPERCritical DISSOLUTION OF KANSK-ACHINSK BASIN BROWN COAL

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 4, Jul-Aug 84
(manuscript received 21 Apr 83) pp 73-77

KIRILETS, V. M., GUBIN, S. P., MEN'SHOV, V. I. and PLOPSKIY, Ye. Ya., Kansk-Achinsk Scientific Research Institute of Coal

[Abstract] The authors' institute and the Institute of Chemistry and Chemical Technology, Siberian Department, USSR Academy of Sciences, are developing conditions for liquefaction of coal and other solid fuel substances by supercritical solvents which can simultaneously act as hydrogen donors in the process of hydrogenation. The process consists of heating coal with the solvents to 400-450°C and holding the mixture in a closed volume. The solvents used are lower alcohols and lower alcohols plus additives. Gas formation of the process does not exceed 10% as the solid matter. It is assumed that hydrogenation of coal and the liquid product formed from it occurs due to oxidation of the lower alcohol to an aldehyde or ketone. Liquid products were separated from the group of compounds, yielding phenols, asphaltenes, paraffins, neutral oils and a benzene-insoluble portion. The compounds contained were studied by IR and PMR spectroscopy. Most of the organic compounds obtained consist of aromatic structures with 2 to 5 substituted hydrogen atoms in the ring. The possibility is shown of using the liquid products of supercritical dissolution of coal as boiler fuel corresponding in characteristics to grade M-100 fuel. References 11: 5 Russian, 6 Western.
[360-6508]

HYDROGENIZATION OF COAL IN PRESENCE OF CATALYSTS ON CARBON CARRIER

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 4, Jul-Aug 84
(manuscript received 1 Nov 82) pp 78-81

YASHINA, T. N., KRICHKO, A. A., PEREDERIY, M. A., PCHELINA, D. P., SURINOVA, S. I. and YULIN, M. K., Institute of Fossil Fuels

[Abstract] Cobalt-molybdenum catalysts on a spherical carbon carrier were used in hydrogenization of coal. The spherical shape of catalyst granules assured stability of hydrodynamic conditions and good wear resistance. Catalysts were prepared by soaking spherical carbon carriers with solutions of ammonium molybdate of various concentrations and cobalt nitrate, then holding for 3 hours at 50°C in an inert medium. The activity of catalysts with active phase MoO₃ increased with increasing concentration of the carrier from 5 to 8 and 15%, the conversion rates improving the yield of liquid products increasing from 44.8 to 60.9%. The most active catalyst was 13% MoO₃ and 6.5% CoO, yielding 71.5% liquid products. The concentration of active phase and pore structure of the carbon carrier were both found to influence the activity of the catalyst in hydrogenization. Increasing the pore volume of the carrier or the quantity

of active phase leads to an increase in the degree of conversion, though with increasing catalysts surface gas formation increases and the yield of liquid products decreases. References 4: 2 Russian, 2 Western.
[360-6508]

COMBUSTION

UDC 614.841.12

EXPERIMENTAL STUDY OF CONCENTRATION LIMITS OF IGNITION IN HYDROGEN-OXYGEN-DILUENT MIXTURES

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 4, Apr 84
(manuscript received 12 Jul 82) pp 862-865

SHEBEKO, Yu. N., IL'IN, A. B. and IVANOV, A. V., All-Union Scientific Research Institute of Fire Safety, Moscow

[Abstract] An experimental study was performed of the concentration limits of ignition in mixtures of hydrogen with various diluents burning in air and in oxygen. Diluents used included nitrogen, carbon dioxide, helium, argon, chloropentafluoroethane and 1,2-dibromotetrafluoroethane. Concentration limits were determined for a flame propagating upward in a 0.05 mm diameter glass tube 1.5 m in height with bottom open and top closed. The possibility is demonstrated of calculating the concentration of fuel on the lower branches of the flame curves as well as the concentration of fuel and diluents at the flame points for chemically inert diluents. Figures 3; references 10: 6 Russian, 4 Western.
[271-6508]

UDC 614.841.12

SPECIFICS OF COMBUSTION OF RICH MIXTURES OF ORGANIC COMPOUNDS WITH AIR AND UPPER CONCENTRATION LIMITS OF IGNITION

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 4, Apr 84
(manuscript received 12 Jul 82) pp 866-870

SHEBEKO, Yu. N.

[Abstract] A study is made of the influence of acetylene on the critical temperature of transition of oxidation of CO to a chain-thermal explosion in a mixture of CO, H₂, H₂O and C₂H₂, also containing hydrogen atoms at about 10¹⁴ cm⁻³ in the 900-1200K temperature range at a pressure of 100 kpa. The kinetics of combustion of CO in advance of the flame near the boundary between

the flame and the reaction zone are studied to determine the critical condition of transition of the slow oxidation of carbon monoxide to chain explosion. Analysis of the chemical combustion of rich organic compound mixtures in air, by initial decomposition to CO, H₂O and other hydrogen-containing compounds, shows that in the reaction zone at the critical temperature, which is between 1000 and 1100K, a transition is made from a branched chain mechanism of oxidation of CO to chain-thermal explosion, and that furthermore the value of the critical temperature is independent of the chemical nature of the organic fuel which is burning. Figures 2; references 16: 12 Russian, 4 Western.
[271-6508]

UDC 541.138:621.135

ELECTROCHEMICAL AND PHOTOELECTROCHEMICAL PROCESSES ON ELECTRONS BASED ON ANISOTYPICAL SILICON-TITANIUM DIOXIDE HETEROJUNCTION

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 7, Jul 84 (manuscript received 20 Dec 82) pp 929-933

KULAK, A. I. and POZNYAK, S. K., Scientific Research Institute of Physical-Chemical Problems, Belorussian State University imeni V. I. Lenin, Minsk

[Abstract] Results are presented from studies of electrochemical and photoelectrochemical processes on an electrode consisting of a plate of monocrystalline p-type silicon with a film of TiO_2 precipitated on its surface. It is found that the Si- TiO_2 electrode has a number of properties distinguishing its behavior in electrochemical and photoelectrochemical processes from Si- and Ti- TiO_2 -electrodes. They include, particularly, inhibition of processes in which holes from the silicon participate and an increase in the effectiveness of processes involving movement of electrons from the TiO_2 /solution boundary to the TiO_2 /Si boundary. The specifics of movement of electrons through the E_c of impurity zone of TiO_2 include subsequent recombination with holes from the E_v zone of the silicon which can be represented in the first approximation by the tunnel-recombination model of an anisotropic heterojunction. Figures 4; references 9: 1 Russian, 8 Western. [343-6508]

UDC 541.138

ELECTROCATALYTIC ACTIVITY OF COAL WITH VARIOUS STRUCTURES IN OXYGEN REDUCTION REACTION

Moscow ELEKTROKHIMIYA in Russian Vol 20, No 7, Jul 84 (manuscript received 20 Dec 82) pp 940-944

SHTEYNBERG, G. V., KUKUSHKINA, I. A., DRIBINSKIY, A. V. and TARASEVICH, M. R., Institute of Electrochemistry, USSR Academy of Sciences, Moscow

[Abstract] Electrochemical properties were studied for coal from various origins with various degrees of activation and significantly differing mesopore surfaces. Activation was performed by the steam-gas method, the

degree of activation monitored by the quantity of carbon consumed for bulk weight. Coal was studied immediately after activation, as well as after ash removal in hydrofluoric and hydrochloric acids with subsequent heating to 900°C in hydrogen. The electrocatalytic activity of the coal was studied in a floating gas diffusion electrode, assuring equal access to the surface of the coal in the oxygen reduction reaction. Polarization curves were measured for all coal specimens in an atmosphere of oxygen and in air. The electrochemical and structural data obtained indicate that when there are no limitations in terms of mass transfer in the coal electrode, the kinetics of the electrochemical process of oxygen reduction are largely determined by the micropore structure of the coal. Figures 4; references 7: 6 Russian, 1 Western.

[343-6508]

FERTILIZERS

CAPACITIES UNDER CONSTRUCTION

Moscow SEL'SKAYA ZHIZN' in Russian 5 Jul 84 p 1

[Unsigned article entitled: "Capacities Under Construction"]

[Text] Mary - The command "Go" was heard at the Turkmenskiy Nitrogen Fertilizer Factory which is under construction near the city of Mary. The first group of enterprises with an annual capacity of 765 tons of ammonium nitrate was just started.

The Turkmen factory of nitrogen fertilizer is being built directly near a base of raw materials, viz., the deposit of natural gas in southern Turkmenistan.

12596

CSO: 1841/329

FERTILIZER PRODUCTION OVER PLAN

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Jul 84 p 1

[Article entitled "Fertilizers Above the Plan" by V. Pryadko, correspondent]

[Text] Chemists of the Dneprodzerzhinsk Association "Azot" are actively participating in the solution of the Food Program. Every twenty-four hours enterprises send tank cars from the spur tracks with mineral fertilizer for kolkhozes and sovkhozes. As a rule, one to two tank cars in railway pool is over the plan.

From the beginning of the year, workers of the Association have sent to the farms more than 10,000 tons of liquid fertilizer in addition to plan. The largest contribution to above-plan shipments was made by the collective of the shift led by masters A. Baskov and A. Golovko.

12596

CSO: 1841/329

UDC 663.1.11.002+663.14.031

PRODUCTION OF HIGH QUALITY PROTEIN-VITAMIN CONCENTRATES

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 6, Jun 84 p 7

KATRUSH, R. V. and GARBALINSKIY, V.A., All-Union Scientific Research Institute of Protein Synthesis

[Abstract] One of the major types of raw material for the production of protein-vitamin concentrate feeds for agriculture consists of purified liquid paraffins. The petroleum refining industry in the Soviet Union is now producing liquid paraffins for the microbiological industry to convert into high quality protein-vitamin concentrates for animal husbandry. However, the low content of C_{14} - C_{19} n-alkanes in the paraffin produced has prevented achievement of good fermentation-equipment productivity and the content of residual hydrocarbons in the finished product has not met requirements. Furthermore, use of these products has increased the load on purification systems at protein-vitamin concentrate enterprises. The content of C_{14} - C_{19} n-alkanes must be increased to 80-90% in these products. References 10: 8 Russian, 2 Western.
[319-6508]

FREE RADICALS

UDC 541(64 + 515)

FREE RADICALS GENERATED DURING MECHANICAL DESTRUCTION OF POLYPEPTIDES

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 26, No 8, Aug 84
(manuscript received 24 Feb 83) pp 1665-1673

DUBINSKAYA, A. M., Department of Prepared Drugs Branch, Scientific Research
Institute of Biological Evaluation of Chemical Compounds; Institute of
Chemical Physics, USSR Academy of Sciences

[Abstract] In the present paper, the rates of mechanical degradation of proteins and various synthetic polymers were compared. The rate of mechanical degradation depends on structure rigidity and increases from linear to spacial polymers. The EPR spectra of free radicals appearing during mechanical dispersion of globular type proteins (serum albumin, insulin, trypsin, subtilisin) and fibrillar protein--collagen--were investigated along with polyamino-acids (polyleucine) and low molecular weight peptides: bacitracine and gramicidine C. In general, the shape of EPR spectra did not change with increased temperature and extended treatment of the polymer. Several radicals were observed during mechanical degradation of polypeptides: $-\dot{\text{C}}\text{HR}(\text{R}_k)$, $-\text{CO}-\dot{\text{C}}\text{R}-\text{NH}(\text{R}_c)$ and R_s . Both of the radicals R_k and R_s formed during the breakdown of macro-molecules, but they were quite different from each other. The R_k radicals are active and convert easily to R_c ; the R_s radicals are not chemically reactive and could be preserved during sample thawing up to room temperature and above. Figures 4: references 24: 9 Russian, 15 Western.
[367-7813]

UDC 541.15

INTERACTION OF HETEROGENEOUS SYSTEM COMPONENTS DURING IRRADIATION AND ITS INFLUENCE ON RADICAL FORMATION

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 5, May 84 pp 1151-1155

KOTOV, A. G. and KOTOVA, N. F., Kemerovo State University

[Abstract] This work was intended to explain the mechanism of influence of zinc oxide on initiation of reactions occurring upon bombardment of isobutylene by ionizing radiation. An evacuated mixture of zinc oxide and isobutylene was

irradiated at 77 and 196K and EPR spectra were taken. It was found that as the surface was filled with isobutylene to form a monolayer, irradiation led to the formation of chemisorbed ions, hydrocarbon radicals and an increase in the concentration of electrons in the conductivity zone. Reaction equations are suggested for the formation of radicals in isobutylene. The yield of radicals in the heterogeneous system differs from the yield in pure components due to radiation chemisorption, the difference in affinity for electrons of the components and the appearance of the electric field induced by ionizing radiation, which increases the lifetime of a separated pair and the rate of initiation of polymerization. Figures 2; references 6: 4 Russian, 2 Western. [287-6508]

SEPARATION OF NITRIC ACID FROM AQUEOUS ALKALI METAL SOLUTIONS BY DIALYSIS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 6, Jun 84
(manuscript received 24 Nov 82) pp 1397-1399

SPIRIN, E. K., SMIRNOVA, N. M. and LITVINENKO, V. G.

[Abstract] Results are presented from studies of diffusion dialysis of aqueous mixtures of nitric acid plus alkali metal salts. Experiments were performed in a two-chamber cell of organic glass. Chamber 1 contained 250 cm³ of the initial acid-salt mixture, while chamber 2 contained 450 cm³ of distilled water. Chambers were separated by an ion exchange membrane with a working surface of 100 cm². The separating properties of MA-40, MAK-1, commercially produced membranes and experimental specimens of thin homogeneous membranes based on 2, 5-methylvinylpyridine obtained by chemical grafting of the monomer to irradiated polyethylene film 15-30 μ m thick were tested. For all of the homogeneous membranes the variation in nitric acid transfer through the membrane as a function of concentration in the initial solution is linear, the specific acid transfer remaining rather high even with relatively low values of initial concentration. The variation in end product concentration in the diffusate as a function of time with identical content in the initial solution for the membrane studied shows that during the first two hours there is a linear increase in concentration of nitric acid in the diffusate, after which the rate of transfer decreases. Figures 2; references 5: Russian.
[356-6508]

STUDY OF PROPERTIES OF THERMAL INSULATING MATERIALS BASED ON POTASSIUM-SILICATE CEMENTS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNIKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNLOGIYA in Russian Vol 27, No 6, Jun 84 (manuscript received 10 Oct 82) pp 697-699

FEDOROV, N. F., KOZHEVNIKOVA, L. V., BORISOVA, V. B. and SEMEYNYKH, N. S., Department of Chemistry and Technology of Adsorbents, Leningrad Institute of Technology imeni Lensovet

[Abstract] Hydration cements based on potassium-silicate and certain oxides developed in the author's laboratory have high compressive strength and good adhesion to various materials. It was assumed that they could be used as the basis for production of heat insulating materials. This assumption was tested for potassium-iron-silicate, potassium-cobalt-silicate, potassium-nickel-silicate and potassium-copper-silicate cement. They were prepared using K_2CO_3 , FeO , NiO , CoO , CuO and metasilicic acid. The physical-mechanical and heat insulating properties of the material based on these potassium silicate cements was determined and compared to fiber glass and porous clay materials. The potassium-silicate cement-based materials are comparable to the porous clay material but have significantly greater strength and better adhesion, making them more suitable as construction materials. These materials, obtained by foaming potassium-silicate cements, have low density, low heat conductivity, good structural quality, high compressive strength and bond strength with metals. Figure 1; references 3: Russian.
[339-6508]

ELECTRODE PROPERTIES OF MEMBRANES BASED ON DIALKYL DERIVATIVES OF DIBENZO-18-CROWN-6

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 39, No 4, Apr 84
(manuscript received 24 Feb 83) pp 613-616

NOROV, Sh. K., MAMADZHANOV, L. M., TASHMUKHAMEDOVA, A. K., SAYFULLINA, N. Zh. and TASHMUKHAMEDOV, B. A., Bukhara Technologic Institute of Food and Light Industry; Institute of Biochemistry, Uzbek SSR Academy of Sciences, Tashkent

[Abstract] A study is made of the electrode properties of membranes based on a number of dialkyl derivatives of DB18K6 [Dibenzo-18-crown-6] in a polyvinyl chloride matrix plasticized with dioctylphthalate. It was found that the linear potassium function of these membranes is retained over a range of concentrations of potassium chloride from $1 \cdot 10^{-5}$ to $1 \cdot 10^{-1}$ mol/kg, pH 3.0-10.5. Selectivity coefficients of potassium-selected membranes were determined for ions of lithium, sodium, ammonium, rubidium and cesium. All of the membranes studied in KNO_3 , KI, KCl, K_2O_4 and KSCN showed reduced values of potassium function, a result of the increase in partial transport of ions with increasing lyophilicity. Figure 1; references 12: 8 Russian, 4 Western.
[278-6508]

ORGANOMETALLIC COMPOUNDS

UDC 546.814+547.1'13

TIN-ORGANIC CARBAMYL DICHYANOMETHANIDES, NITROSOCARBAMYL CYANOMETHANIDES AND CARBAMYL CYANOAMIDES

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 7, Jul 84
(manuscript received 9 Dec 83) pp 47-49

SKOPENKO, V. V., corresponding member, UkSSR Academy of Sciences, LAMPEKA, R. D. and KELER, Kh. [KÖHLER, H. ?], Kazan State University imeni T. G. Shevchenko; Chemistry Section, M. Luther University, Halle (GDR)

[Abstract] One of the criteria for anion pseudohalogenicity is the existence of pseudohalogenide compounds having covalent bonds that are analogous to corresponding halides. Many such organometallic compounds, both linear and non-linear, are presently known. In the present work compounds of the type R_3SnA , where $R = CH_3$ or C_4H_9 and $A = (NC)_2CC(O)NH_2^-$, $ONC(CN)C(O)NH_2^-$ and $NCNC(O)NH_2^-$, were synthesized by reaction of R_3SnCl with the corresponding silver salt. The structures were determined by IR-spectroscopy. These compounds are of practical as well as theoretical interest owing to their possible use as polymer stabilizers, olefin polymerization catalysts and biocides. References 9: 2 Russian, 7 Western.
[376-12765]

UDC 66.02

OPTIMIZING LOW TEMPERATURE REACTION FOR SYNTHESIS OF ORGANOMETALLIC COMPOUNDS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 6, Jun 84
(manuscript received 25 Oct 82) pp 1266-1270

DOMRACHEV, G. A., KARNATSEVICH, V. L., ANDREYEV, I. G., SHEVELEV, Yu. A. and NEMTSOV, B. Ye., Institute of Chemistry, USSR Academy of Sciences

[Abstract] The purpose of this work was to optimize the process of low temperature synthesis of organometallic compounds in a cylindrical reactor with fixed conditions of evaporation of the metal by selecting the ligand distributor, thus providing the condition $[L]/[M]=const$ throughout the entire

surface of the chamber, and to determine the possible values of ligand consumption as it is fed into the chamber under conditions of simultaneous condensation of metal atoms and ligand molecules. Distribution functions constructed for metals and ligand considering the spatial diagram of directivity of the fluxes depend on metal evaporation conditions and ligand exhaust conditions as well as the geometric specifics of the reactor used. The optimal ratio of reactor dimensions is $h/d=0.75$. A circular ligand distributor is preferred. Figures 4; references 5: Russian.
[356-6508]

PESTICIDES

GAS CHROMATOGRAPHIC DETERMINATION OF CHLORINE-CONTAINING PESTICIDES IN ATLANTIC OCEAN SURFACE WATERS

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 39, No 4, Apr 84
(manuscript received 22 Mar 83) pp 723-728

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Antarctic Scientific Research Institute, Leningrad

[Abstract] Gas chromatographic determination of pesticides was used to estimate the content of a number of common pesticides in water samples taken in the Atlantic from 43°S to 55.5°N during the 6th "Polex-South 81" expedition on the scientific research vessel "Professor Viz." Water samples were taken from the surface of the ocean in polyethylene containers at the bow of the ship when stopped or at low speed. Chromatogram peaks were identified by comparing the delay parameters of pesticides of known composition with those contained in the specimens. Gas chromatographic study of hexane extracts from samples of sea water with an electron capture detector found more than 25 chlorine-containing pesticides in concentrations of over 1-2 mg/l. More than 10 pesticides were present in concentrations of 1 to 550 mg/l. Pesticides found included α -hexachlorocyclohexane, γ -hexachlorocyclohexane, (lindane), o,p'-DDD, p,p'-DDD, p,p'-DDE, o,p'-DDT, p,p'-DDT, DDMU, dieldrin, methoxychlor and nitrochlor. Figures 2; references 10: 9 Russian, 1 Western. [278-6508]

POWER ENGINEERING: STEPS TOWARD FUTURE

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 6 Sep 84 p 2

[Interview with M. Styrikovich, presidium member and USSR Academy of Sciences academician conducted by N. Zaporozhets]

[Text] Perspectives on the development of power engineering are at the center of attention of the scientists and specialists from many countries, gathered in Moscow for the 10th conference of the International Association on the Properties of Steam. There, a wide variety of problems related to the design and use of energy installations and the increase in their reliability and economic efficiency will be discussed. Here is what M. Styrikovich, presidium member and USSR Academy of Sciences academician, says of this:

Almost 80 percent of the electric energy which has been developed in our country falls to the share of steam turbine power plants operating on both fossil and nuclear fuels.

It would seem that the properties of steam would have already been studied long ago. However, the practice of creating and using energy installations nevertheless runs into new problems. And how could it be otherwise? In the 20's when the first powerful steam turbine installations appeared, their operating steam pressure was 30-35 atmospheres and the temperatures reached 400 degrees. But today these parameters have reached 240-300 atmospheres and 550-600 degrees. And there is a necessity to raise these even higher in order to improve the economic viability and reliability of the units.

All this has required the undertaking of fundamental thermodynamic research, a difficult, laborious and expensive business. Therefore, the idea was born to unite the efforts of the industrially developed countries to develop reliable recommendations on the use of the properties of steam. This idea found its embodiment in the convening of international conferences. And to coordinate research, the International Association on the Properties of Steam was created, which was joined by representatives of the USSR, the United States, England, Canada, France, the Federal Republic of Germany, the Czechoslovak Socialist Republic and Japan.

[Question] Which of the problems raised in the almost one hundred reports and communications would you single out as the most urgent?

[Answer] One such problem is related to the wide introduction of computers and automation in the practice of designing and controlling power units. For example, in the calculations for the huge power units of an atomic power plant, hundreds of thousands of parameters are used, of which 80-90 percent relate to the properties of steam. By the way, until recently such calculations were done on the basis of water and steam tables which were developed and refined under the leadership of the International Association on the Properties of Steam. However, the tabulated data is not suitable for entry into a computer. They must be reworked into special equations. Work in this direction is now being actively undertaken. And certain results from it are being introduced for discussion by the conference participants.

No less important a problem is the fact that in practice, it is not pure water, but aqueous solutions which are being dealt with. Although impurities comprise extremely small concentrations in the water, they exert a noticeable influence on the operation of the powerful power units of thermal and atomic power stations. Under conditions of high pressure and temperature, steam interacts with construction materials, thereby forming products which dissolve in the carrier, and then precipitate out onto the components of the equipment. All this compels the continuous use of pure water. Indeed, even small deposits on the turbine blades noticeably reduce its economic efficiency and developed power.

[Question] Mikhail Agol'fovich, what significance do the problems discussed at the conference have for our power engineering?

[Answer] As you know, the USSR Power Engineering Program envisages the advanced development of nuclear energy, both for the production of electricity and for heat energy, and the putting into effect of an active energy conservation policy. In this regard, the problems of ensuring uninterrupted operation of atomic power plants and increasing reliability of all elements of the equipment acquire particular significance. The basic causes of outages are most often related to failures in the operation of steam power equipment. And the main culprits of outages are the various forms of electrochemical corrosion of metal.

The operating conditions of fossil fuel power plants have also become substantially more complicated. This is particularly true of energy units which are shifted frequently from a basic operating regime to a semi-peak or peak operating regime. Frequent stops and starts lead to the danger of damaging the massive components of the energy installation due to the significant thermal stresses which they undergo repeatedly. The probability of this increases sharply for components operated in a corrosively active environment. Consequently, in order to increase the operational reliability of the power units, it is necessary to observe an operating regime for

water, and in order to do this, it is necessary to know the properties of aqueous solutions. And finally, research in this area is very significant for the creation of geothermal power plants and water distillation plants.

[Question] How would you evaluate the results of cooperation among scientists and specialists of various countries in studying the properties of water and steam?

[Answer] From the beginning the joint efforts concerned not only the exchange of knowledge and research results, but the development of international materials which are consistent and standardized and which could be used for calculations concerning power engineering equipment. In order to do this it is necessary to conduct numerous independent measurements, recheck the information obtained and improve the research methods. Particularly now, when increasingly greater demands are made on the properties of water and steam. The current 10th conference of the International Association on the Properties of Steam will undoubtedly make a sizeable contribution to the "storehouse of knowledge" about them, and to their actual use in the practice of power engineering.

12318

CSO: 1841/372

STORAGE TANK FOR LIQUEFIED PROPANE

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 Sep 84 p 1

[Article by A. Korolev]

[Text] At the construction site of the Tobol Petrochemical Combine, among taiga spruce, an unusual storage tank was covered by a sloping steel "cap," like a Boletus mushroom. If compared to a residential building, it would be no less than eight stories high. It is designated for the storage of liquified propane which is substituted for gasoline in automobile engines.

Designers from the State Scientific Research and Design Institute for Special Petroleum Installations in cooperation with specialists from the Western Siberian Petrochemical Installation Trust used compressed air during assembly of the storage tank.

"Such a method," says chief project engineer, B. Mileshtin, "was used during construction of storage tanks for liquified hydrocarbon gases in Nizhnevartovsk. But raising a rather complicated structure, weighing 12 tons, by air, has never been done before.

"Outwardly, this entire unique operation appeared prosaic. First, both halves of the roof inside the cover were joined by metal ties. Then, two powerful fans with a directed air stream raised them to the necessary height like a piston in a cylinder.

"The same lifting principle has also been decided upon for use at the Rossoshan Chemical Plant imeni 60th Anniversary of the USSR. There they have already started the erection of an isothermic storage tank intended to store 45,000 cubic meters of ammonia needed for the production of fertilizer.

"But the record by volume," said B. Mileshtin in conclusion, "will be a natural gas storage complex in Yerevan--a project which has already been developed in our institute. Each of the three storage tanks there will contain 60,000 cubic meters of liquified gas."

12318

CSO: 1841/372

GAS PIPELINE ACROSS KAMA RIVER

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 Sep 84 p 1

[Article by A. Reshetov on laying the transcontinental gas pipeline across the Kama River]

[Text] Four times the gas fitter-guides have assaulted the Kama River in the region of the town Sarapul, dragging through it primary and reserve sag pipes for gas pipelines (the transcontinental Urengoy-Pomary-Uzhgorod and Urengoy-Center One). They completed the operation with high marks, significantly ahead of schedule. Now it was necessary in five days to drag a sag pipe more than 70 meters long and weighing more than 2,000 tons through the river for Urengoy-Center Two.

And now the exciting moment had arrived: the next assault on the river had begun. In the operations area, the traffic of ships, self-propelled barges and hydrofoils had been halted. Only the impetuous gulls bore themselves over the river's glassy surface. V. Lysyuk, operations director carrying out the duties of the chief engineer of the Sixth Leningrad Administration for Specialized Submarine and Technological Operations, established communication via radio set with the right bank where the powerful winch was located. There, the senior officer of the diving team, V. Serbin--who more than once checked the condition of the trench underwater--was in charge.

Lysyuk gave the signal to get ready. The line noticeably tightened over the river, winding onto the winch drum. The lashing trembled, hoisted by the pipelaying cranes, and after four minutes, moving from its position, crept into the water. And after another 15 minutes the buoy fell into the river--a blue barrel fastened by a line to the head of the sag pipe. Now, V. Ol'ferovich's pipelaying crane released its heavy burden, approaching the very river bank. After five minutes, V. Danilevich's pipelaying crane was unfastened and after eight minutes, R. Khabetdinov's machine. And now the "tail" drew alongside the beginning of the next lashing. The pulling ceased. Forty minutes in all had passed.

"A good beginning," noted V. Lysyuk. "But it will be more difficult later. With every lashing welded on, the sag pipe will become heavier."

Yesterday, the laying of the sag pipe for the fuel main of Urengoy-Center Two was successfully completed.

12318

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PROMISING OIL DEPOSITS IN KOMI ASSR

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Jul 84 p 2

[Article entitled "Oil of Zapolyar'" by V. Krukovskiy, correspondent]

[Text] The magnificent and deep Usa, which cuts the polar Priural'e from the east to the west, has become somewhat of a natural southern boundary of the new region of petroleum deposits in the northern part of Komi ASSR. The republic gets three fourths of all its oil from there. This region is one of the most important in the Timano-Pechorsk industrial complex. On the right side of the river, close to the Arctic circle, a large industrial node has sprung up in a short time, which consists of a small oil industry, borax, construction and other enterprises. Here the oil pipeline Usa--Ukhta--Yaroslavl' and the young growing Usinsk, begins. From a very high place, an impressionistic picture of the laborious feat of geologists, builders, and oilmen who have created all this opens up in the vast forest-tundra. But when you think about the fact that all of this large and difficult establishment has been supported up until now completely on two "whales"--the Usinskyi and Vozeyskiy oil deposits, it is impossible to shrug off the feeling of alarm; both deposits "peaks" for obtaining fuel were passed two years ago. And the summit is that place, of course, where the descent begins. According to the predictions of specialists the descent is expected to be steep.

"Today it is completely, definitely apparent that geologists did not miss any possible opportunity for the registering of deposits"--says Deputy Head of the technological section of the Komineft' Production Association V. Timofeev.

It was, namely, the fact that approximately forty deep exploratory wells were drilled where oil was supposed to be and they turned up dry... Next to well 1,439, drilled on the wall of the Vozeyskiy deposit and which had given water, they had placed their entire group. In vain technicians proved to chief geologist of the Production Association, N. Lisin, that there was no sense in drilling there. "It is planned that way" he said. Well no. 1,438 was drilled and proved to be unproductive. And it cost about one million rubles.

Now the republic gives more than 20 million tons of oil and condensate, a solid addition to the general union balance of liquid fuel. New discoveries are possible. All this made the RSFSR Ministry of Geology concentrate serious resources here, to think through deeply and from all sides the strategy of

geological exploration. In 1980 they had intended to increase the volume of deep exploratory drilling to 500 thousand meters per year. In actuality, they had just barely done 200 thousand on the average according to the Arkhangel'ski and Ukhtinski Geological Exploratory Associations.

So it was with the growth of the volume of geological exploratory work in one of the most important and promising oil extracting regions. The limited capacities of deep exploratory drilling from year to year were diffused over a wide territory.

The significant part of meterage of exploratory drilling was concentrated in the less accessible regions, located 300-350 kilometers from functioning oil industries. Thus, there about ten deposits of high viscosity and difficult-to-extract oil from limited supplies was discovered. The utilization of these was hardly probably even beyond the limits of the 12th Five Year Plan.

"The dispersion, as it is, of limited geological exploratory resources has put the interests of the affair in bad stead," says director of the Timano-Pechorskiy section of the All-Union Scientific Research Geological-Exploratory Oil Institut, and well-known in these regions, geologist B. Vasserman. Because of this the explorers have overstepped many promising areas where now, with great delay, it is necessary to return. The Khoreyverskaya depression, especially its southern part, which is directly adjacent to the Usa and Vozeia, is a visible example. Still greater disintegration and strip farming are characteristic for the very administrative structure of geological exploratory work. On the territory of the region about ten independent organizations operate and each with its own code. They all have their own theme, their own science, their own system of processing and interpretation of data obtained. Who is able, or more to the point, in a position, to coordinate their actions, to define the direction of work for the rapid achievements of the main, final result? Are they directly subordinate to the RSFSR Ministry of Geology or to the production associations which are located in other oblasts. Therefore it is unavoidable to say that here "whoever goes to the forest will get the firewood."

Something similar happens in planning geophysics work. Out of 44 field parties which belong to the associations "Pechorgeofizika" and "Sevzapgeologiya", more than half operate in regions which are far removed from tomorrow's needs of oilmen. This is why it is difficult to disagree with the opinion of many specialists who consider that explorers of mineral resources must coordinate much earlier the basic directions of their explorations with oil and gas men. The "Kombineft" association, in order not to reduce their yield, must, beginning from 1986, explore new deposits. Where will they get them? Those fields, which are relatively close and which are possible to develop with appropriate technology, are still not explored, not evaluated. And those which have been explored are now impossible to use.

"Who said to you that there is nowhere for oilmen to go?" exclaimed the general director of the "Ukhtaneftegazgeologiya" Association B. Nikitin. "And Khar'yaga? Already in August we will enclose its stores. They had to begin its use yesterday..."

The Khar'yaginskaya deposit actually belongs to a class of future deposits. But oil here freezes at a positive temperature of nine to thirteen degrees. Furthermore it contains up to 42% parafin. On the other hand, the most eastern, on one latitude from Usinskiy and Vozey, the discoveries of the Sandiveyskoe, Boganskiy and Misyurshorskiy deposits, contain light oil of high quality. The first of them was discovered in 1981. But for three years little was done to evaluate it. It was located there in the drilling on about ten wells. And there were fewer at other drilling sites.

"We hope to give an industrial evaluation of the Boganskiy deposit by 1986, says B. Nikitin. "For this it is necessary to drill there not less than one hundred thousand meters of wells."

Thus, in the near future, only Khar'yaga is likely to be used. But here the most complex technical and technological problems await the oilmen. The location, a good hundred kilometers north of Vozey, is far from the Arctic circle. By the good graces of geologists, oilmen must in a short time span make a powerful jerk to the north, having left behind and to the side completely real, but, alas, open possibilities.

The difficulties and problems will grow a hundred fold. It will actually be necessary to lay one hundred kilometers of roadway, transmission lines, pipelines. Special techniques and drilling technology, special equipment, specific methods of construction work are all necessary. It is necessary to deliver a 2.5-3 million ton shipment into the interior. To do this the Pechorsk steamship company is needed in full force. River transport workers must already begin the dredging and other work on the tundra rivers in order to prepare them for the massive seasonal transport of freight.

"The problem is not one of the simplest" says general director of the Komineft Association Anatoliy Stepanovich Gumenyuk. "It is necessary to invest 350-400 million rubles in the short term for developing the riches of the Kolvinskiy terrace, and to put them into operation. Today, in my opinion, there is no other way to avoid the collapse of the mining of fuel in the region..."

The specialists and scientists univocally think that it is very important not to lose time. It is necessary to process without delay, to the planning of at least the roads, transmission lines and forward outposts.

Other variants, as they say, are possible. Perhaps, the explorers for oil will cease looking at the regional borders, and concentrate their energy and resources on the rapid evaluation of those areas which will give a return tomorrow, but not in the distant future? I have in mind most of all the southern part of Khoreyverskoy depression and the Shapkinsko-Yur'yakhinskiy terrace. Then surely other possibilities will open up and it may be possible to go to the far West without haste, basically prepared. Here is something for the specialists from USSR Gosplan and interested ministries to think about.

The oilmen themselves must smooth over the acuteness of the problem to some degree. It is necessary to accelerate the pace of the final exhaustion of the oil deposits of the Izhemskiy region. There are still reserves for

increasing the output of fuel at Yareg, Eastern Tebuk, in the deposits of heavy oil at Usa; there is the possibility not only to decrease, but, maybe, to increase, in the twelfth Five Year plan, the output of oil in the European North. But for this it is necessary to act without hesitation.

12596

CSO: 1841/329

IMPROVEMENT OF PETROCHEMICAL INDUSTRY

Moscow EKONOMICHESKAYA GAZETA in Russian No 27, Jul 84 pp 1-2

[Staff article: "The Extended Refining of Oil" by V. S. Fedorov]

[Text] The basic suppositions of the USSR Energy Program forecast, in the long run, the increase of motor fuels resources primarily as a result of improved refining of petroleum, and an actual decrease in the expenditure of mazut by electrical power stations. The widespread use of condensed and liquefied natural gas and the organization of the production of synthetic motor fuels from gas, coal and combustible shale has also been noted. Large-tonnage combined systems of oil refining must be developed and put into production.

Oil refining and the petroleum-chemical industry continue to develop in 1984 at a rapid pace. For example, the production of synthetic rubber grew in comparison with 1983 by 8.3%.

In 1984 new capacities will be put into operation for the primary refining of oil and the hydro-scrubbing of diesel fuel at the Chimkent and Achinsk oil refineries, and for the production of synthetic rubbers in the Nizhnekamskneftekhim Production Association and for tires of various types in the Belotserkovskiy Production Association.

The climax of all this is the construction of the new giant of petroleum chemistry in Western Siberia--the Tobol'sk Combine. Here, by the end of the current year a central gas fractioning unit will be put into operation--the heart of the new enterprise. By-product gas will serve as the basic raw material for the combine; it will be obtained, together with oil, from the fields of the Tyumen oblast. The future flagman of the branch will be the production of synthetic rubber and plastics, fuel-oil materials, mineral fertilizers and consumer goods.

Competition has developed in the branch for the early introduction and mastery of the new capacities. It was decided to complete, first, the installation of the large production facilities-- of ethylene in the Salavatnefteorgsintez Production Association and of coke at the Volgograd Oil Refinery because of the concentration of capital investment material, labor and financial resources. together with construction and installation organizations. The planned capacities at the Mazheykskiy Refinery in Latvia were developed ahead of

schedule. The complex for the extended refining of petroleum at the Moscow Oil Refinery, and also the capacities for making aromatic hydrocarbons at the large-tonnage systems in the Omsknefteorgsintez Production Association and at the 22nd CPSU Congress Ufa Oil Refinery were put into operation early within planned limits.

A series of the most important scientific-technical programs for the solution of problems for the extended refining of oil, the creation and mastery of production of new types of lubricating materials, and products of organic synthesis were realized.

The USSR Minister of Oil Refining and Petroleum-Chemical Industry, V. S. Fedorov spoke about the work of the branch in 1984 in an article following.

In the energy program of the country, among the fundamental developmental trends of our branch of industry, there is no problem more important than the raising of the efficiency of petroleum use--the most valuable and non-renewable hydrocarbon resource. In this connection, the extending of oil refining with the purpose of maximum extraction of mazut and heavy petroleum residues for the production of motor fuels, grease, and petrochemical raw materials for helping the more completed processes and technological schemes has acquired decisive significance.

The enterprises of the USSR Ministry of Petrochemical Industry, as is known, support the economy with motor and boiler fuels, lubricating materials, coke and bitumen, products of organic synthesis, a wide assortment of tires, rubber and asbestos technical objects, and goods of everyday culture and for medical use.

In comparison with 1970, the volume of petrochemical products has grown more than twice as much. In 1940 for example, three million automobile tires were produced in the country; in 1970--34.6 million and in 1983--62 million. The demands of the economy for our product are constantly growing. It is possible to satisfy them more fully only by intensification.

As comrade K. U. Chernenko mentioned in a meeting with workers of the Moscow metallurgical plant "Hammer and Sickle", in speaking about the careful, thrifty approach to coal, ore, oil and gas: "Our supplies are actually large. But it is well known that nature does not renew them. And their mining is becoming more expensive. Because of this it is necessary to take care of the resources for future generations and therefore to extract them with intelligence and use them rationally."

For the workers of our branch this means that they should obtain the maximum amount of the most valuable products from each ton of oil in order to reduce the production of heating oil.

Contemporary technological processes of oil refining, the widespread introduction of which began in the present Five-Year Plan, presents such a possibility. The capital financing systems of the new generation, which were recently put into operation in the Moscow and Pavlodar oil refineries, and also the

hydrocracking equipment, the construction of which has been completed in the Omsknefteorgsintez Production Association, in comparison with the schemes of the shallow separation of oil, has almost reduced by two its relative expenditure in the production of motor fuels.

The implementation of the scientific-technical program, considered in the long run, for the raising of the yield of oil refining has already produced palpable results. Thus, in the past year, by increasing the volume of refined oil by only one percent in toto, the output of benzines, diesel fuels and kerosene has grown by almost three percent.

An increase of capacity of almost four fold in the high-yield refining is planned in the future. More than two dozen contemporary systems, which will draw into operation a significant quantity of heavy residues of oil and mazut, are planned to be made operational, and on account of this to obtain the most valuable clear petroleum products and raw materials for petrochemistry. Together with kerosene gas oil fractioning and vacuum gas oil fractioning, they plan to introduce ethane fractioning, and also to use hydrocarbons of a gas condensate, by-product and natural gas.

Collectives of enterprises of the oil refining and petrochemical industries have accepted for 1984 the socialist demands for ensuring the ahead-of-schedule introduction and mastery of production capacities of a series of new objectives.

In general throughout the branch, the obligated plan is to deliver ahead-of-schedule growth of production capacities for catalytic cracking of oil for hundreds of thousands of tons. It is more to the point to say that in the current year, the introduction of capacities for the high-yield refining of oil will exceed two-fold the corresponding growth for low-yield (primary) refining.

The construction, let's say, of one system of primary refining of oil, which united five processes, in comparison with local installations, reduced the operating costs by 8 million rubles, the construction in process territory by 3.5, the number of service personnel by a factor of 2.2. In general, today, for such aggregates, the capacity for 6-8 million tons annually is one third of all the refined oil in the country.

The oil refining and petrochemical industries are developing especially intensively in the regions of Western and Eastern Siberia.

The strengthening and combining of fundamental processes remains the basic technological policy of the branch and in the forthcoming period, as the Energy Program of the USSR has defined it. Already in the first stage of its operation, measures are planned which are directed at the rational placement of enterprises of the branch. This is reflected in full force in the plan for 1984.

Especially in Siberia, where today the most significant oil bearing regions are concentrated, such an important economic problem as the formation of unified complexes, which combine the processes of oil refining and organic synthesis, are being solved in practice.

In the Tyumen oblast a new flagman of the branch has been created--the Tobol'ski Petrochemical Combine. In the final year of the Five-Year Plan its first section--the high-efficiency gas fractioning apparatus--was put into operation. The gas, which is associated with oil extraction, will be divided into separate components for preparing synthetic rubbers on the basis of the achievements of Soviet science and technology, and a unique native apparatus.

In Irtysh, the construction of large interconnected enterprises for the production of many types of products of organic synthesis--butadiene, isoprene, methanol, ethylene, propylene and also different types of rubbers--is planned as a project consisting of this above mentioned industrial giant. Here the experience obtained during the period of the installation of the Nishenokamski Petrochemical Complex will be widely used.

New construction plays a very large and important role for use. This is also connected with the improvement of the location of production facilities and the mastery of new types of products. In the past, however, the branch was subjected to sharp and just criticism for the underutilization of existing capacities and for large supplies of idle equipment. Colleagues of the USSR Ministry of Petrochemical Industry drew very serious conclusions from this. Now the situation has been corrected.

Reconstruction and technical retrofitting of existing enterprises has become the main path of growth of industrial potential of the branch.

In the 10th Five-Year Plan less than two thirds of capital investment was allocated to these purposes; in the 11th Five-Year Plan their share has increased to 73%. The capacities for the primary refining of oil, the production of grease, lubricants and oil coke has grown in 1984 as a result of the technical retrofitting at a series of enterprises.

Technical retrofitting of oil refining and petrochemical enterprises is planned primarily for the widespread application of contemporary processes such as catalytic cracking, hydrotreating and hydrocracking, isomerization, alkylation and catalytic reforming. This will allow a significant increase in the production of high-octane motor fuels and aromatic hydrocarbons for the production of detergents and different synthetic materials. Further growth of the capacities of catalytic cracking and reforming of benzene fractions will raise the share of benzene with octane to number 76 and higher in the overall volume of their production to 80 percent or so.

In the present Five-Year Plan we have created, essentially, a new branch of the petrochemical industry--the production of synthetic lubricants.

The use of these in the economy is connected with the transition of aviation and ground transportation to such high speeds, during which the working ability of moving mechanisms cannot be supported by lubricating materials made from oil because of the insufficient thermal stability of natural lubricants.

The synthetic rubber industry made a significant step forward in 1984. The structure and quality of products were improved. In particular, the production of stereoregular and other progressive types of rubbers will increase. The industrial production of siloxane rubbers for medical use for the preparation of the elements of artificial heart valves, soft-cloth prostheses and joints will become familiar.

This year in the tire industry, the serial production of super-large size tires for dump trucks with a load range of 75-110 tons will begin. The Bobruyskshina Production Association will begin production of them. In the Belotserkovskiy Production Association of tires and rubber-asbestos products, the serial production of radial tires with metal belts for light automobiles of the All-Union Automobile Factory has been organized. The annual plan calls for raising the durability of tires for trucks and buses to 92-94 kilometers and for automobiles to 48.3 kilometers.

The USSR Energy Program plans to conduct an active energy conservation policy based on accelerated scientific-technological progress. This situation is especially applicable to our branch. Indeed, we use oil not only as a raw material, but also use more than 13% of its resources which are dispersed throughout industrial production.

In 1984, the enterprises of the branch established differential goals for the economy and for the additional lowering of the expenditure of fuel and energy.

Measures have been developed and implemented which reduce the irretrievable loss of oil and oil products against established norms. Non-wasteful, low-consumption and energy conservation technological processes are actively put into operation.

The hard workers of the oil refining and petrochemical industries, in the fourth year of the Five-Year Plan, pledged to achieve an above-plan increase of the productivity of labor by 1% and additionally to lower the production cost of products by 0.5%. For the last five months the productivity of labor grew by 2.7% against the planned 0.9%. The economy received an additional ten thousand tons of automobile gasoline, oil bitumens, ethyl alcohol, a large quantity of synthetic rubber, automobile tires, rubber technological goods, and consumer goods.

At the same time we were not able to maintain the fulfillment of all agreed pledges. Not all consumers received in full measure such very important types of products such as lubricants, paraffins, and liquefied gases. The unsatisfactory export of finished products and the interruptions in the delivery of raw materials played here a well-known role. The basic reasons, however, was not attributable to this. We have large reserves, involving insufficiently efficient use of production capacities, a disconnection in practice of inter-related production facilities, and often in entire branches. This, in particular, was reflected also in the fact that the pledges for the additional lowering of the production cost of products was not fulfilled in full. For five months this index improved against the goal of 0.46%.

The more rapid elimination of existing shortages, counting errors and omissions and the widespread distribution of experience of leading collectives will aid the fulfillment of goals and pledges of this year and the Five-Year Plan in general by all the production associations and enterprises of the branch.

[The above article has an addendum of pertinent industrial news items]:

Moscow Refinery

In the period January to May the collective of the Moscow Oil Refinery (director E. Dzhashidov) fulfilled the plan completely by realizing the planned agreed-upon pledges for shipments for this period. The capital refiners spread actual socialist competition for the improvement of the indexes of the intensification of production.

In comparison with the same period last year the productivity of labor for five months rose by 3.3% versus 0.9 for the plan. The cost of production additionally was lowered by 0.87%.

Kirov Tires

The collective of the Kirov Tire Factory (director Yu. Vorob'yev) successfully fulfilled the plan and socialist pledges of the fourth year of the five year plan. Here it became the rule to strictly observe the times and volumes of all agreements for shipments.

Instead of one percent, the according-to-plan labor productivity for five months rose, in comparison with the same period last year. The production cost additionally was lowered by one-half percent.

Voronezh Synthetic Rubber Plant

The enterprise (director L. Kudriavtsev) completed the five month program, having maintained a 100% realization of products in line with the agreed pledges for shipment.

For the five months, in comparison with the same period last year, labor productivity rose by 3.1% versus the goal of 0.9%. The pledges were fulfilled for the lowering of production costs additionally by 0.5%.

"Azrezinotekhnika" Production Association

The inadequacies in the organization of labor and production led to the fact that the production association "Azrezinotekhnika" (general director A. Nasirov) fulfilled only 94.3% of the five month program for the realization of pledges for shipment.

In comparison with the same period last year, labor productivity did not grow, as planned, but decreased.

"Chimkentshina" Production Association

The Production Association "Chimkentshina" (general director V. Tereshchenko) was able to fulfill only 89.8% of its pledges for shipments for the period January-May. The collected supplied many consumers, but itself was a loser.

The increase of the planned production costs for products, the insufficient growth of labor productivity negatively reflected on the dimensions of the association's resources for economic stimulation.

"The Groznefteorgsyntez" Production Association

In this production association (general director V. Mel'nichenko) the attention paid to overseeing the discipline of shipments was weakened. The plan for five months for the realization of agreed upon pledges was only fulfilled by 96.6%.

Many production resources were not operationalized. The association did not cope with the five month goal for the growth of labor productivity and did not maintain the planned lowering of production costs.

12996
CSO: 1841/329

GAS PIPELINE UNDER CASPIAN SEA

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Jul 84 p 2

[Article, "Gas Pipeline Under the Caspian Sea", by D. Melikov]

[Text] Baku. The construction and the hydraulic tests have been completed for the longest gas trunk line under the Caspian Sea, which connects the Bakhar deposit, where the basic part of shipping fuel is obtained, with the gas refinery.

It shortens the journey of Caspian gas almost two fold, replaces seven pipelines which fed the refinery with the raw material. The gas trunk line, traveling under a 30 meter depth of Caspian water, was laid on the bottom by a special ship--a pipeline layer. On board, its own conveyor operated: the pipes were connected to one another in an unbroken steel thread, x-rayed and covered with anticorrosive insulation and placed on the bottom.

12596

CSO: 1841/329

UDC 66.092

THERMAL DECOMPOSITION OF PENTAERYTHRITE ESTERS IN CONTACT WITH METALS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 6, Jun 84
(manuscript received 2 Aug 83) pp 1343-1348

YUTINA, G. A., GROMOVA, V. V., IL'INA, T. V. and POLINA, M. V., Leningrad
Institute of Technology imeni Lensovet

[Abstract] A study is presented of the thermolysis of pentaerythrite tetra-caproate, a model of an ester base oil, in contact with various metals and alloys. Thermolysis of the ester was performed in a static system in a medium of argon in glass sealed ampules. Thermal decomposition of the ester was performed in the presence of Bst.3ps, ShKh-15 steel, copper, iron and lead. The experimental conditions were: temperature 340°, experimental duration 4 hours, ester:metal ratio 1:1 by weight. The metals were arrayed as follows in terms of activity in decomposition of the ester: Cu<Pb<Fe (Bst.3ps., ShKh-15). Activity of the metals in thermal decomposition of caproic acid follows the same sequence. The composition of decomposition products of the acid is virtually the same as decomposition of pentaerythrite tetracaproate under identical conditions. Figures 3; references 2: Russian.
[356-6508]

UDC 621.43.019.8

STRUCTURE OF MOTOR FUEL HYDROCARBONS, THEIR PHYSICAL, CHEMICAL PROPERTIES AND MAJOR OPERATIONAL CRITERIA (OCTANE AND CETANE NUMBERS)

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 6, Jun 84
(manuscript received 6 Jan 83) pp 1362-1365

GAVRILOV, B. G., Leningrad State University imeni A. A. Zhdanov

[Abstract] Alkenes (olefins) have the highest octane number of all gasoline hydrocarbons, since they have a C=C double bond which is 1.5 times stronger than the C-C single bond. They are followed by isoalkanes, since their branching process involves liberation of heat, related to the formation of a

thermally more stable molecule. The data on temperature of beginning of thermal breakdown of several alkane hydrocarbons correlate with their octane numbers. Thermal stability is confirmed as a good criterion for estimating octane numbers. The cetane numbers of diesel fuels follow the same principle of thermal stability of the hydrocarbons which compose them. The less the thermal stability or the greater the rate of thermolysis, the higher the cetane number or the less the autoignition delay. The sequence of hydrocarbons in increasing cetane number is: N-alkanes > isoalkanes > alkenes > cyclanes > aromatic hydrocarbons. Figure 1; references 9: Russian. [356-6508]

UDC 665.612:532.739.2

GAS CONTENT OF STRATAL PETROLEUM IN AZERBAIJAN

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 6, Jun 84 pp 20-22

ALIYEV, E. Sh., SHELEVOY, N. Sh. and VINOGRADOV, K. V., Azerbaijan Scientific Research, Planning and Design Institute of Petroleum

[Abstract] This article summarizes a number of studies in the area of solubility of gas in petroleum in deposits in Azerbaijan. The experiments on gas solubility were performed by the Section of Thermodynamics of Stratal Systems, earlier by the Laboratory for Study of Strata and Wells of the authors' institute, and covered the period from 1952 through 1983. The many years of study established that the properties of stratal petroleum, particularly solubility of gases in the petroleum, change significantly more over geographic area than among strata. The solubility coefficients presented in this article for the various deposits of Azerbaijan are better correlated than true solubilities. The distribution of the parameter over territory and among strata remains the same as that of true solubility coefficients. The adjusted solubility coefficients presented consider deviations in the petroleum-gas system from Henry's law. Figures 2; references 3: Russian. [351-6508]

UDC 622.24.05:622.241.6

OPERATION OF DRILLING COLUMN BOTTOM ARRANGEMENTS IN SUPERDEEP WELLS

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 6, Jun 84 pp 29-33

VADZHAFOV, N. I., Azerbaijan Scientific Research, Planning and Design Institute of Petroleum and BABAYEV, A. K., Saatlinskaya Petroleum Prospecting Expedition

[Abstract] A report is presented on equipment used to center and maintain vertical the drill head equipment used to drill a very deep well. It is found that suspending a portion of the equipment beneath the turbine drill shaft

has a negative influence on stability of operation of turbine drills and complicates selection of the required effective combination and location of elements over the length of the well face equipment to prevent curvature of the borehole column. Use of the type NAG column equipment has a negative influence on the status of the well column. Installation of the TRS-9 stabilizer influences curvature of the well differently depending on its location. If the TRS-9 is located above the turbine drill in most cases it has a negative influence on curvature of the well, while its placement immediately above the bit or above the ROP-9V centering-expanding device (which is installed over the bit) prevents drilling out the walls of the well near the face and helps to hold the tool vertical. Installation of the ROP-9V above the ISN (without the TRS-9) results in one-sided wear of the drill bit equipment, deflection from the vertical and curvature of the well column. The use of low speed A7Sh-RM and A7GTSh turbine drills requires limitation of the axial load on the bit; otherwise, great curvature results. The recommended configuration is: needle drilling bit plus ROP-9V + TRS-9 + KDM-6m + ROP-9V + turbine drill + UVT178-mm-2lm + drill pipe string.
[351-6508]

UDC 622.275.43.004.58

RESULTS OF EXPERIMENTAL WORK ON ISOLATION OF WATER LEAKS IN DEEP OIL WELLS

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 6, Jun 84 pp 34-36

ASAD-ZADE, A. I., Scientific Research and Planning Institute, Gipromorneftegaz

[Abstract] A new isolation solution has been suggested to reduce influx of water into deep oil wells. The solution contains sodium silicate 7%, alcohol 0.01%, water-soluble polymer 0.05% and fresh water 92.94%. The isolating capacity of this solution results from the fact that when it contacts stratal water it forms a gel which subsequently solidifies and plugs the most permeable pores in the seam, the main paths through which water leaks into an oil well. Laboratory studies were performed to evaluate the promise of the use of the solution. Factors studied included the degree of gel formation of the isolation solution in stratal water, variation in solution viscosity as a function of temperature, the influence of filtration rate, stratal temperature and volume of filtering fluids on ratio of permeability of the porous medium before and after injection of the isolating solution. The results of the laboratory experiments were verified in three gas lift wells. After isolation using the new solution the oil production of these wells increased by a factor of 2.2, the volumes of water and gas decreasing 2.1 and 1.3 fold. The laboratory tests and practical experience thus agree that the new solution for selective isolation of water influx into oil wells with high stratal temperature and pressure and various filtration speeds, stratal temperatures and volumes of extracted fluid after isolation is stable in a porous medium. Figures 4; references 3: Russian.
[351-6508]

DEVELOPMENT OF OIL FOR HIGH SPEED EQUIPMENT SPINDLES

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 6, Jun 84 pp 42-44

KULIYEV, R. Sh., SARKISYAN, V. M., Institute of Petrochemical Refining, AzSSR Academy of Sciences; ASHRAFOV, A. A., Baku Electric Machine Building Plant
 imeni the 50th Anniversary of the Communist Party of Azerbaijan

[Abstract] Studies were performed in an attempt to find a domestic substitute for the imported spindle oil spinox-10S. Domestic low viscosity industrial oils I-5A and IGP-4 were tested in comparison with spinox-10S. The results of the tests showed that IGP-4 oil had good usage properties. It is recommended for lubrication of spindle machines rather than the imported oil spinox-10S.
 [351-6508]

UDC 665.7.038.2+665.733.038+665.733.038.2

MECHANISM OF ACTION OF SURFACTANT-BASED ANTIICING ADDITIVES

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 6, Jun 84 pp 18-20

YEMEL'YANOV, V. Ye., All-Union Scientific Research Institute of Oil Refining

[Abstract] Antiicing additives must be able to modify the structure of ice on carburetor surfaces and must be effective to removing moist and sticky ice. Surfactants, mixtures of polyamines and succinic acid esters, alkylsuccinic acids, oxyethylated alkylphenols and the products of the interaction of mixtures of technical amines and higher carboxylic acids, alkylsuccinic acid esters and polyamines, complex esters and other compounds were studied. The antiicing effectiveness of the additives was evaluated on a single-cylinder engine. The best antiicing properties were manifested by products of the interaction of alkylsuccinic acids and polyamines, as well as mixtures of polyamines and succinic acid esters which, even in concentrations of 0.01% by mass, were equal in effectiveness to isopropyl alcohol at 2%. Comparative studies with and without the surfactants were used to determine the mechanism of action of the substances. The studies showed that increasing the concentration of the surfactants between 0.01 and 0.1% did not increase their effectiveness. The ice crystals formed with the surfactant present were needle shaped or elongated and plate-like, preventing the ice crystals from sticking to each other and thus reducing the icing rate. References 4: 3 Russian, 1 Western.
 [319-6508]

INFLUENCE OF FUNCTIONAL ADDITIVES ON HYDROLYSIS OF DIESTERS

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 6, Jun 84 pp 20-21

YECHIN, A. I., NOVOSARTOV, G. T. and KONDRAT'YEVA, T. B.

[Abstract] The influence of various functional additives on the hydrolysis of diester oils was studied by the qualification method, consisting of determination of changes in the acid number of the oil and water extract after holding of preliminarily homogenized mixtures of oil with 25% water at 100°C for 48 hours. The studies showed that pure dioctylsebacinate is practically not hydrolyzed, as indicated by its low acid number and pH of water extracts. Introduction of tricresylphosphate causes a significant increase in acid number, indicating intensive hydrolysis. Tricresylphosphate hydrolyzes to form orthophosphoric acid which catalyzes hydrolysis of the diester. Other antiwear additives had no significant catalytic effect on hydrolysis of DOS, being hydrolytically stable themselves. Phenyl- α -naphthylamine, dialkyldiphenylamine and benzotriazole did not catalyze hydrolysis of DOS but did not inhibit the effect of tricresylphosphate. The hydrolysis of the diester can be reduced or eliminated by neutralizing acid compounds using compounds with clear basic properties such as aliphatic amines. Secondary or tertiary aliphatic amines are thus suitable to provide high hydrolytic stability for synthetic diester-based oils. Figure 1; references 3:

2 Russian, 1 Western.

[319-6508]

UDC 665.765-404.033

AGING OF INDUSTRIAL OILS I-20A AND IGP-38 DURING USE

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 6, Jun 84 pp 21-23

GUREYEV, A. A., YEVDOKIMOV, A. Yu., LEBEDEV, V. S., POPOVA, N. N. and FAL'KOVICH, M. I., Moscow Institute of the Petrochemical and Gas Industry imeni I. M. Gubkin

[Abstract] I-20A and IGP-38 oils, taken from mill equipment after 1000-3500 hours of operation at 50-80°C with pressure in the hydraulic systems up to 5 MPa, were studied. The phenomena occurring during aging of oils were determined by noting the changes in physical and chemical properties as a function of operating time. The criterion $f[\text{InH}]_0$ is suggested, where f is the stoichiometric coefficient of inhibition representing the number of ROO radicals interacting with one molecule of inhibitor. $[\text{InH}]_0$ is the initial concentration of oxidation inhibitors in moles per liter. This product is the antioxidant capacity, characterizing the effectiveness of an antioxidant inhibitor at a given concentration. This criterion shows the effectiveness of oxidation inhibition in breaking the oxidation chain ($\text{RH} \xrightarrow{\text{R}^\bullet} \text{ROO}^\bullet$). The

change in antioxidant capacity can be used to study the kinetics of the initial and final stages of oxidation. The data obtained show that natural antioxidants contained in fresh oil are consumed in the stage of initiation of the oxidation chain. The formation of phenol type products, pyrenes and anthracenes which inhibit the oxidation of hydrocarbons increases the antioxidant capacity of the oil during the middle stages of the oxidation process. The maximum increase in the number of aromatic structures in the oils occurs at around 1000 hours. Figures 3; references 6: Russian.
[319-6508]

UDC 542.943.7:542.971.2

OXIDATION OF m-XYLENE IN LIQUID PHASE IN PRESENCE OF COBALT BROMIDE CATALYST

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 7, Jul 84
(manuscript received 28 Nov 83) pp 55-57

SHCHERBINA, F. F., Department of Petrochemistry, Institute of Physical-Organic Chemistry and Coal Chemistry, UkSSR Academy of Sciences, Kiev

[Abstract] To clarify its reaction kinetics, a study was made of oxidation of m-xylene with oxygen in glacial acetic acid solution and a mixture of cobalt acetate and sodium bromide as catalyst. The reaction mechanism is shown to be a radical-chain process with degenerate chain branching, while the catalyst initiates and sustains chain growth. Figures 3; references 12: 10 Russian, 2 Western.
[376-12765]

UDC 622.276.6

EFFECTIVENESS OF TREATMENT OF FILTERING SEAM ZONE IN PETROLEUM BOREHOLES

Kiev NEFTYANAYA I GAZOVAYA PROMYSHLENNOST' in Russian No 2, Apr-Jun 84
pp 37-39

LESOVOY, G. A., MARYAK, S. G. and BOBELYUK, V. P., "Ukrneft'" Production Association, Ukrainian Planning and Scientific Research Institute of Petroleum

[Abstract] Various methods of working the seam zone around filters have been tried by "Ukrneft'" Association to stabilize production of petroleum: hydraulic bursting of seams, acid treatment, treatment with surfactant and heat treatment. Analysis of production results have shown that the effectiveness of all methods varies with their usage conditions. With otherwise equivalent conditions results are better in wells not over 3000 m deep. All methods decreased in effectiveness as time passed due to exhaustion of deposits, increases in water content and repeated utilization of the same methods.
[294-6508]

BOREHOLE TESTING EXPERIENCE AT 'UKRNEFT' ASSOCIATION

Kiev NEFTYANAYA I GAZOVAYA PROMYSHLENNOST' in Russian No 2, Apr-Jun 84
pp 22-25

SHEMELYAK, B. T., BARANOVSKIY, M. I. and MIRONENKO, B. G., Ukrainian State Planning and Scientific Research Institute for Petroleum, "Ukrneft"
Production Association

[Abstract] Testing of boreholes involves some 20% of prospecting drilling and 11% of total drilling time in the Ukraine. This article describes the conditions under which borehole testing is performed and methods used in the Ukraine. Since 1982, the authors' association has utilized borehole testing teams in 3-shift operation, minimizing lost working time and speeding up the process of testing production wells. Well testing operation can be improved by the use of prepared filters, the use of cumulative perforation for secondary opening of strata with porous collectors, by opening production horizons in boreholes under depression using TNKT and PR-type perforators, by performing preparation work in special liquid such as petroleum, highly concentrated inverted emulsion solutions, stratal water or aqueous chloride solutions treated with nonionogenic surfactants, by limiting depression in the seam to 15-20 MPa in porous and jointed collectors, by using large volume treatment with highly concentrated acids with the addition of reaction and corrosion inhibitors and by the use of high density washing fluids based on calcium chloride containing starch.

[294-6508]

INFLUENCE OF JOINTING OF COLLECTORS ON WORKING OF OIL DEPOSITS

Kiev NEFTYANAYA I GAZOVAYA PROMYSHLENNOST' in Russian No 2, Apr-Jun 84
pp 39-41

LANTSBERG, V. F., Ukrainian State Planning and Scientific Research Institute of Petroleum

[Abstract] A mathematical model is suggested for two-phase filtration in jointed-porous media, based on representative of the jointed-porous medium as a medium with dual porosity, in which each point in the space is assigned two parameters representing the porosity of joints and the matrix. It is assumed that the permeability of the system of cracks is much greater than that of the matrix block in which seepage is through pores. The model allows effective solution of the problem of extraction of petroleum by water from jointed and jointed-porous collectors. The major condition required for successful application of the model is reliable information on the parameters of the jointed rock, physical properties of fluids and characteristics of exchange functions for each of the strata studied. Figures 2; references 5: 4 Russian,

1 Western.

[194-6508]

PREDICTION OF SLOPE PROCESSES ALONG PATH OF PIPELINES

Kiev NEFTYANAYA I GAZOVAYA PROMYSHLENNOST' in Russian No 2, Apr-Jun 84
pp 42-43

KOSTYUCHENKO, N. N. and GAYDUCHENKO, V.I., Kiev Branch, All-Union Scientific
Research Institute of Pipeline Construction

[Abstract] An important condition for the assurance of operating reliability of pipelines in hilly areas is prediction and prevention of slides, erosion and other slope processes along the pipeline path. Negative effects can be prevented if during planning and construction geologic and hydrogeologic conditions of the territory are carefully studied. Unfortunately, in selecting pipeline paths, present practice considers geologic terrain factors much less than conditions for transportation of construction machinery in hilly territories. Optimal selection of a pipeline path through slide areas requires use of material from geologic and hydrologic surveys performed in the area where construction is to be undertaken. References 2: Russian.
[294-6508]

UDC 547.314

NEW SESQUITERPENE LACTONES FROM CENTRAL KAZAKHSTAN PLANTS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 4, Jul-Aug 84 pp 37-40

KAGARLITSKIY, A. D. and ADEKENOV, S. M., Institute of Organic Synthesis and Carbon Chemistry, KaSSR Academy of Sciences, Karaganda

[Abstract] Structure of sesquiterpene lactones from yarrow and wormwood species prevalent in Kazakhstan was determined by aqueous extraction followed by extraction by chloroform. New sesquiterpene lactones (anobin, arglabin, glabellin, arlatin and artepaulin) were isolated from epigeal parts of *Achillea nobilis*, smooth wormwood, broad-leaved wormwood and few-flowered wormwood. Isolation of guanolides (argabine, glabelline and matricarine) from *Artemisia glabella* Kar and Kir and eudesmanolides (artepauline, alpha-santomine) from *Artemisia pauciflora* Web. confirmed chemotaxinomically the correctness of the systematic placement of smooth wormwood in the section *Absinthium* DC. of subgenus *Artemius* L. and few-flowered wormwood in the subgenus *Seriphidium* Bess. Detection of chanphylline in *Achillea nobilis* showed the systematic close relationship of the genera *Achilles*, *Artemisa* and *Handelia*. References 9: 7 Russian, 2 Western.
[358-2791]

UDC 547.447:615.277.3

SYNTHETIC STUDIES OF DERIVATIVES OF ACETYLFORMAMIDOXIME IN ORDER TO OBTAIN ANTI-TUMOR COMPOUNDS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 4, Jul-Aug 84 pp 64-68

POPLAVSKAYA, I. A., KURMANGALIYEVA, R. G. and KHALILOVA, S. F., Order of Labor Red Banner Institute of Chemical Sciences, KaSSR Academy of Sciences, Alma-Ata

[Abstract] Synthesis of derivatives of acetylformamidoxime containing and not containing a cytotoxic bis(20chloroethyl) amino grouping is described and discussed. Biological tests showed the considerable role of the acetylformamidoxime grouping in the total cytostatic effect of acetylformamidoxime derivatives. References 10: 5 Russian, 5 Western.
[358-2791]

STRUCTURAL-SORPTION PROPERTIES OF ACTIVATED TYPE KAU COAL USED FOR MEDICAL PURPOSES

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 6, Jun 84
(manuscript received 20 Oct 82) pp 1225-1230

STRELKO, V. V., KOROVIN, Yu. F., KARTEL', N. T. and SHCHERBITSKIY, A. B.,
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Sciences

[Abstract] Results are presented from a study of the pore structure of KAU activated coal. The range of physical and mechanical as well as adsorption characteristics was determined. The studies were performed on specimens of type KAU coal produced by the vapor-gas method of activation (water vapor at 850°C) with progressive heat treatment. Analyzing the technical characteristics of type KAU sorbent it can be seen that carbon with a moderate degree of activation is of the greatest medical interest. These specimens have good strength, suitable granulometric composition, low ash content and bulk density close to 0.5 g/cm³. This is important for the creation of mass transfer devices for hemosorption. Figures 3; references 8: 7 Russian, 1 Western. [356-6508]

UDC 547.245:615.015.35+615.28

SYNTHESIS AND BIOLOGICAL ACTIVITY OF 3-PERFLUOROACETOXY-3,3,3-TRIFLUORO- AND 3-FLUOROPROPYLSILITRANS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 18, No 7, Jul 84
(manuscript received 5 Dec 83) pp 811-816

VORONKOV, M. G., D'YAKOV, V. M., KUZNETSOVA, E. E., FLORENKOVA, O. N.,
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Sciences

[Abstract] Previously unknown compounds mentioned in the title were synthesized and their neurotropic effects studied. The 3-perfluoroacetoxypropylsilitrans produced are low-melting-point crystalline substances or oily odorless fluids easily soluble in chloroform and ether. The compounds were found to be practically nontoxic, whereas 3-fluoro and 3,3,3-trifluoropropylsilitrans have high and moderate toxicity. It was found that lengthening the carbon chain and increasing the number of fluorine atoms in the molecule leads to a decrease in toxicity and some increase in neurotropic activities. References 9: 4 Russian, 5 Western. [359-6508]

SYNTHESIS AND LOCAL ANESTHETIC ACTIVITY OF 6-[(ω -AMINO- ω -ARYLALKYL)]-BENZO-1,4-DIOXANES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 18, No 7, Jul 84
(manuscript received 29 Nov 83) pp 816-820

DAUKSHAS, V. K., RAMANAUSKAS, Yu. Yu., UDRENAYTE, E. B., BRUKSHTUS, A. B.,
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imeni V. Kapsukas

[Abstract] In order to find new medicinal preparations, the authors synthesized and studied a number of benzo-4-bioxane analogs which were previously unknown or not studied in terms of their local anesthetic properties. New compounds were synthesized by heating 6-[(ω -aroylalkyl)]-benzo-1,4-dioxanes with ammonium formate and subsequent acid hydrolysis of the N-formyl derivatives formed. All of the amines produced were studied as hydrochlorides. Acute toxicity upon subcutaneous administration was determined in white mice, infiltration anesthesia was studied in guinea pigs, surface anesthesia on rabbit cornea, local irritating properties in white mice. Most active was a 6-[(ω -amino- ω -arylalkyl)] benzo-1,4,-dioxane. This compound was also less toxic than nocovaine. The compounds are moderately locally irritating, more so than novocaine or trimecaine but less so than permacaine or dicaine. The compounds are promising for infiltration anesthesia, less active for superficial anesthesia. References 11: 7 Russian, 4 Western.
[359-6508]

SYNTHESIS AND BIOLOGICAL ACTIVITY OF N-SUBSTITUTED 2-PYRROLIDONES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 18, No 7, Jul 84
(manuscript received 18 Jul 83) pp 823-827

STEZHKO, T. V., GRANIK, V. G., GLUSHKOV, R. G., ROSHCHINA, L. F., POLEZHAYEVA, A. I., and MASHKOVSKIY, M. D., All-Union Scientific Research Chemical-Pharmaceutical Institute imeni S. Ordzhonikidze, Moscow

[Abstract] A study was made of the synthesis and biological activity of a number of -2-pyrrolidone derivatives obtained from pyracetam and products of its chemical conversions. In experiments on mice it was shown that some of the compounds have a protective effect against oxygen insufficiency, increasing survival time in a sealed chamber. The most active compound was α -(pyrrolidone-2-yl-1) β -dimethylaminoacrylonitrile (VI) which increases survival time of mice to 44.2 and 60.8 minutes over 26.7 minutes in the control group which received sodium chloride. Compound VI is superior to pyracetam in this respect by a factor of approximately 2. None of the compounds showed a protective effect against hemic hypoxia caused by administration of sodium nitrite. Several of

the compounds increased the latent period of convulsions and time of death caused by administration of thiosemicarbazide. Compound VI was once again most effective, increasing the latent period from 57.4 to 81.7 minutes, time of death from 62.8 to 83.3 minutes. The compounds did not change the pain sensitivity threshold in mice as determined by the hot plate method. The LD₅₀ for white mice was 1500-2000 mg/kg. The most active compounds showed no changes in spontaneous bioelectric activity in ECG studies on cats. References 3: 1 Russian, 2 Western.
[359-6508]

UDC 615.281:547.29'26].012.1

SYNTHESIS AND STUDY OF ANTIMICROBIC ACTIVITY OF DIACETYLENE FATTY ACID ESTERS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 18, No 7, Jul 84
(manuscript received 28 Jun 83) pp 827-829

MAKHSUMOV, A. G. and ERGASHEV, M. S., Tashkent Medical Institute

[Abstract] Performing directed synthesis intended to produce highly active bactericidal preparations, the authors synthesized asymmetric diacetylene esters of fatty acids containing biologically active groups. The compounds were produced by reacting propargyl esters of lauric, margaric and stearic acids with 1-bromophenylacetylene, 1-bromopropargyl alcohol, 1-bromopropargyl ester of m-nitrophenol in the presence of analytic quantities of copper chloride, m-butylamine in an organic solvent. The structure of the compound obtained was proven by elemental analysis, IR and NMR spectroscopy. The effect of the preparations synthesized against pathogenic microorganisms and intestinal disease pathogens was studied. The most active preparations were found to be 1-phenylpentadiene-1,3,5-laurate and 1-(stearate)-hexadiene-2,4-6-ol. These compounds are 1.5 to 2 times more active than levomycetin or streptomycin against the streptococcus, bacterium proteus, bacterium pyocyaneum, Salmonella, Shigella and E. coli microorganisms tested. References 4: 3 Russian, 1 Western.
[359-6508]

UDC 615.277.3:547.497.1].012.1

SYNTHESIS AND BIOLOGICAL ACTIVITY OF BISTHIOSEMICARBAZONES OF 3-ETHOXY-2-OXO-BUTYRALDEHYDE AND THEIR COMPLEXES WITH Cu (2+)

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 18, No 7, Jul 84
(manuscript received 21 Nov 83) pp 835-839

DILANYAN, E. R., OVSEPYAN, T. R., ARSENYAN, F. G., GARIBDZHANYAN, B. T., MIRONOV, Ye. A. and VOL'PIN, M. Ye., Institute of Heteroorganic Compounds, imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow; Institute of Precision Organic Chemistry imeni A. L. Mndzhoyan, Armenian SSR Academy of Sciences, Yerevan

[Abstract] In order to produce new derivatives of bithiosemicarbazide (KTS) and establish the influence of modification of the structure of KTS on its

antitumor activity, the authors synthesized and studied the biological activity of substituted bithiosemicarbazones 3-ethoxy-2-oxo-butyraldehyde and their copper complexes. All compounds produced were identified by elemental analysis, IR and UV spectroscopy. The study of the toxicity and antitumor activity of the compounds synthesized was performed by administering the substances to animals intraperitoneally in 0.5% carboxymethylcellulose solutions. Acute toxicity was determined on white mice. The chemotherapeutic experiments were performed on experimental models of sarcoma 45, Walker's carcinoma and ascitic Ehrlich carcinoma based on the percent of inhibition of tumor growth and increase in survival time of animals. It is found that 3-ethoxy-2-oxo-butyraldehyde bithiosemicarbazone has manifest toxicity but high antitumor activity for solid animal tumors. In therapeutic doses this compound inhibits the growth of sarcoma 45 and Walker's carcinoma by 65-85% without influencing the growth of ascitic Ehrlich's tumor. The copper chelates have no antitumor activity for sarcoma 45 but reliable therapeutic effect against Walker's carcinoma, though none against ascitic Ehrlich's carcinoma. The antibacterial activity of the compounds was low. References 13: 5 Russian, 8 Western. [359-6508]

UDC 541.64:539.199

EFFECT OF THERMAL TREATMENT OF MOLECULAR MOBILITY IN POLYVINYLIDENE FLUORIDE

Moscow VYSOKOMOLEKULARNYE SOYEDINENIYA in Russian Vol 26, No 8, Aug 84
(manuscript received 19 Sep 82) pp 1571-1576

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[Abstract] High temperature treatment (HTT) of polyvinylidene fluorides (PVF) has been shown to affect their structure. The goal of this work was to investigate the effect of HTT on molecular mobility of PVF. As a result of HTT the order of PVF system increased resulting in a shift of mechanical glass transition region towards higher temperatures. Along with the glass transition region, an increase in treatment temperature of PVF shifted the relaxation transition and segmental motion towards higher temperatures as well. The cause of relaxation transition at 273 K could be due to the non-uniformly stressed state of the amorphous area of highly crystalline samples. Above 273 K, relaxation is observed in paracrystalline and crystalline domains of PVF. With the increase in temperature and longer duration of the treatment of PVF the number of structural elements exhibiting molecular mobility in paracrystalline areas was decreased. Figures 2; references 12: 7 Russian 5 Western.
[367-7813]

UDC 541.64:547.554

IMINODIACETATE DERIVATIVES OF POLYVINYL BENZYLAMINE AND THEIR CHELATE FORMING PROPERTIES

Moscow VYSOKOMOLEKULARNYE SOYEDINENIYA in Russian Vol 26, No 8, Aug 84
(manuscript received 1 Oct 82) pp 1577-1583

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S. M. Kirov

[Abstract] The goal of this study was to develop an effective synthetic method for novel complex forming iminodiacetate ion exchange resins with linear and

spacial structure based on polyvinylbenzylamine (PVBA); in addition, the relationship between the structure of sorbents and their physical-chemical and chelating properties were investigated and compared to low molecular weight model compounds. These linear and spacial PVBA's were obtained by reacting chloromethylated PS and styrene copolymers in divinylbenzene with a mixture of phthalimide and potassium carbonate followed by treatment with hydrazine hydrate. Comparative kinetic studies of PVBA reactions with chloro and bromoacetic acid were carried out along with determination of their activation energies, acid-base characteristics and sorptional capacity. In general, these polymers appeared to be polyampholytes capable of complex formation. Modification of polyamine with monochloroacetic acid yielded ion exchange resins with homogeneous iminodiacetate functional groups, superior in their properties to the known polyampholites of the Dowex A-1 and ANKB-50 type. Figures 7; references 23: 19 Russian (3 by Western authors), 4 Western. [367-7813]

UDC 541.64:536.4:547(313.3+322)

THERMAL DESTRUCTION OF VINYL CHLORIDE COPOLYMERS WITH PROPYLENE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 26, No 8, Aug 84
(manuscript received 27 Dec 82) pp 1623-1627

LISITSKIY, V. V., BRONNIKOVA, V. N., MULLOYANOVA, L. F., KUBOVSKAYA, N. I., ZAVODCHIKOVA, N. N. and YANOVSKIY, D. M., Bashkir State University imeni 40th Anniversary of October

[Abstract] The effect of propylene links on reaction kinetics of HCl elimination during thermal destruction of compositionally homologous vinyl chloride (VC) copolymers with propylene was investigated. Increased content of propylene in the copolymer macromolecules lowered their molecular weight and increased the elasticity. Increased number of propylene links led to a regular increase in the rate of HCl elimination from VC, which was related to the destabilizing effect of the propylene links methyl groups on the neighboring VC links, as was shown by the ratio of rate constant of the formation of isolated double bonds $-C=C-$ $R_C:k_C:k_C''=1:6.5:45$. The structure and the role of labile oxygen containing groups in VC-propylene copolymer were analogous to their role in PVC. Figures 2; references 8: 5 Russian, 3 Western. [367-7813]

MICROPHASE STRUCTURE OF ION CONTAINING POLYMETHANOUREYLENES

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 26, No 8, Aug 84
(manuscript received 3 Jan 83) pp 1628-1633

LIPATOV, Yu. S., SHILOV, V. V., DMITRUK, N. V., TSUKRUK, V. V., POLYATSKOVA, N. V., SHEVCHENKO, V. V. and VASIL'YEVSKAYA, G. A., Institute of High Molecular Weight Compounds Chemistry, UkSSR Academy of Sciences

[Abstract] Because of the fact that quantitative data relating to the changes of microphase structure of polyurethanes upon introduction of metal ions are scarce or nonexistent, small and wide-angle x-ray studies of polyurethanoureylenes (PUU) with carboxyl and potassium carboxyl groups in the side chains were carried out. The changes in microphase structure of PUU are introduction of K^+ could be represented in the following way: the presence of potassium ions does not affect the order of macromolecular fragments characteristic of the starting polymer; even though the periodicity of the macrolattice in polyurethanes remains unchanged, its perfection state improves considerably during the transition of the salt form. These changes are connected with improvement of microphase separation of the components due to increased parameter of their interaction. Thus, even though introduction of ionic groups affects the microphase structure of these polymers, it does not lead to formation of specific ionic clusters in these systems. The microphase structure is determined by the character of phase separation of rigid and flexible fragments of the macromolecule; ionic groups affect only the degree of this separation. Figures 2; references 21: 10 Russian (1 by Western author), 11 Western (1 by Russian authors).
[367-7813]

PERMEABILITY, DIFFUSION AND ABSORPTION OF SO_2 IN POLYVINYLTRIMETHYLSILANE MEMBRANES

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 26, No 8, Aug 84
(manuscript received 3 Feb 83) pp 1640-1646

YAMPOL'SKIY, Yu. P., VOLKOV, V. V., KALYUXHNYI, N. E. and DURGAR'YAN, S. G., Institute of Petrochemical Synthesis imeni A. V. Topchiev, USSR Academy of Sciences

[Abstract] Polyvinyltrimethylsilane (PVTMS) is a glass-like polymer which is used to manufacture highly efficient membranes for industrial separation of gaseous mixtures. In the present paper, data are reported on the permeability, diffusion and absorption of SO_2 through uniform and asymmetric PVTMS membranes at 10-50°C and 0-250 kPa. The characteristic feature of the SO_2 transport through these homogeneous and asymmetric membranes is the effect of SO_2

pressure on the transport parameters and on their temperature functions. These transport parameters expressed as a function of pressure may be related to the following factors: concentration function of diffusion coefficients, non-linear sorption isotherms and changed properties of the membrane in contact with the penetrating agent. The correlation between absorption capacity and glassing temperature was established. The high values of P for SO_2 on PVTMS are the effects of high coefficients of diffusion. Figures 6; references 20: 6 Russian (1 by Western authors); 14 Western.
[367-7813]

UDC 678.675'126-278:66.067

SHRINKAGE PHENOMENA IN FORMATION OF CAPRON MICROFILTRATION MEMBRANES

Minsk IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK in Russian
No 3, May-Jun 84 (manuscript received 6 Sep 83) pp 98-101

KORSHUNOVA, T. A., ARTAMONOV, V. A. and SOLDATOV, V. S., Institute of Physical-Organic Chemistry, Belorussian SSR Academy of Sciences

[Abstract] A study is presented of the magnitude of shrinkage in formation of capron membranes from solutions of various concentrations in aqueous acetic acid with various precipitating capacities. Membranes were obtained by a wet method on glass substrates at $20 \pm 2^\circ\text{C}$, washed with deionized water and dried in air. Filtration measurements show that a monotonic decrease in pore dimension with increasing capron concentration is characteristic, the variation being linear for all precipitating solutions. An increase in the content of polymer in the initial solution facilitates the occurrence of shrinkage, separation of the low-viscosity phase and a resulting decrease in pore material volume. This is accompanied by a smooth increase in strength and modulus of elasticity and a decrease in elongation at rupture. The mechanical strength of the membrane is determined by structures formed upon phase transitions in the process of precipitation of the polymer which in turn apparently depends on the structure and concentration of the solutions used. Figures 2; references 9: Russian.
[325-6508]

UDC 541.64:539.3

INTERMOLECULAR INTERACTION IN POLYPROPYLENE FIBERS WITH GRAFT POLYSTYRENE

Minsk IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK in Russian
No 3, May-Jun 84 (manuscript received 17 Aug 83) pp 104-106

PROKOPCHUK, N. R., SHUNKEVICH, A. A., POPOVA, O. P. and SOLDATOV, V. S., Institute of Physical-Organic Chemistry, Belorussian SSR Academy of Sciences

[Abstract] A study was made of the variation of intermolecular interaction energy as a function of the quantity of graft polymer or composite materials

differing from normal PETF-PAA in chemical structure both of the graft polymer and of the polymer matrix. The studies were performed for polypropylene fiber with graft polystyrene. The results showed that irradiation of polypropylene fibers with CO^{60} gamma radiation at 2 Mrad for radiation liquid phase grafting causes a slight decrease in the parameters U_0 , E_{des} [thermal destruction activation energy] and E_{mi} [molecular interaction activation energy], indicating partial radiolysis of polypropylene macromolecules and loosening of the structure of the amorphous fiber areas. The molecular interaction energy in the matrix of the graft polymers first linearly increases, then, beginning at a certain content of graft polymer, also linearly decreases, indicating the formation in these materials of a three-dimensional physical network. Figures 3; references 8: Russian.
[325-6508]

UDC 541(64+138):547.39

PRODUCTION AND ELECTROCHEMICAL PROPERTIES OF GRADIENT MEMBRANES BASED ON MIXTURE OF BUTYLMETHACRYLATE AND ACRYLIC ACID COPOLYMER PLUS POLY-4-VINYLPYRIDINE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 26, No 7, Jul 84
(manuscript received 25 Jan 83) pp 1484-1487

ZUBOV, V. P., LUTSENKO, V. V. and KORNEV, A. P., Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences

[Abstract] Membranes are produced based on a mixture of a copolymer of butylmethacrylate and acrylic acid with poly-4-vinylpyridine (BMA-AA+PVP) with a charge density gradient and their electrochemical properties were studied. The BMA-AA copolymer was obtained by copolymerization in a 30% acetone solution of a mixture of the monomers with cyclohexylperoxycarbonate 0.5% as initiator. The BMA:AA ratio was 82:18. PVP was synthesized by radical polymerization of 4-vinylpyridine in methanol. Membranes were prepared by pouring a 3% solution of BMA-AA+PVP in chloroform on a cellophane substrate and subsequent evaporation at room temperature for 15 hours. The charge density gradient through the thickness of the membrane allows it to generate a potential in electrolyte solutions even under symmetrical conditions, so that it can be used to create ion-selective electrodes in order to determine the ionic activity in electrolyte solutions. Figures 3; references 5: 3 Russian, 2 Western.
[342-6508]

SYNTHESIS OF POLYAMIDE USING BIS-N-OXYSUCCINIMIDE ESTERS OF DICARBOXYLIC ACIDS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 26, No 7, Jul 84
(manuscript received 25 Jan 83) pp 1489-1497

KATSARAVA, R. D., KHARADZE, D. P., AVALISHVILI, L. M. and ZAALISHVILI, M. M.,
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[Abstract] A study is presented of polycondensation of activated N-oxy-succinimide esters of dicarboxylic acids with various diamines. Bis-N-oxy-succinimide esters were synthesized by the trifluoroacetate method. Some of the diesters were also synthesized using the corresponding dichlorides. The results indicated that the trifluoroacetate method was equal in yield of diesters, superior in terms of purity of the product. The studies revealed that bis-n-oxy-succinimide isophthalate (SII) yields polymorphous forms depending on recrystallization and synthesis medium, the low-melting-point form spontaneously converting to the high-melting-point form of SII in two to three weeks of storage. During interaction of the aliphatic diester - bis-N-oxysuccinimide adipate (SIA) with highly basic aliphatic hexamethylene diamine (HMDA) at 30°C the reaction is completed in two hours, forming a high molecular weight film and fiber-forming polyamide. Increasing the temperature to 80 or 130°C reduces the molecular weight of the polyamide. Polycondensation of the second pair of monomers--aliphatic SIA and low basicity aromatic 4,4'-diaminodiphenylmethane--at 30°C occurs heterogeneously and too slowly. When aromatic SII is condensed with aromatic DBM the temperature should be kept relatively low, below 130°C. With the fourth pair of monomers--aromatic SII and aliphatic HMDA at 80°C--a polyamide with viscosity of 0.53 dl/g is obtained in 8 hours, at 120°C a polyamide of slightly higher viscosity is obtained in 30 minutes. The polyamides are easily purified by washing in cold water. Figures 3; references 18: 8 Russian, 10 Western.
[342-6508]

CORRELATION ANALYSIS OF POLYMER GAS PERMEABILITY PARAMETERS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 26, No 7, Jul 84
(manuscript received 25 Jan 83) pp 1498-1505

TEPLYAKOV, V. V. and DURGAR'YAN, S. G., Institute of Petrochemical Synthesis
imeni A. V. Topchiyev, USSR Academy of Sciences

[Abstract] A study is made to determine the most complete correlation rules relating the properties of a gas or polymer and the gas-polymer system, encompassing the parameters of permeability of inert and a number of poly-atomic gases in homopolymers in various physical and phase states. Correlation analysis was based on published experimental data on gas permeability of 28

homopolymers as well as the authors' own experimental results from studies of the diffusion of Rn^{222} and a number of inert gases through polymers by the rheochemical and chromatographic methods. Polydienes, polysiloxanes, polyolefins, halogen-containing and silicon-containing carbon-chain polymers, polymer esters and ketones, polyanides and polymer aromatic compounds were studied. The data indicate that knowledge of diffusion and solubility of three to four gases allows reliable prediction of the gas transfer parameters of a dozen gases. Additional information on permeability, diffusion, and solubility can be obtained for gases such as radon, difficult to obtain by direct experimentation. Figures 2; references 32: 11 Russian, 21 Western. [342-6508]

UDC 541(64+127):539.2

KINETICS OF RELAXATION OF IMPURITY MOLECULES BASED ON REACTIVITY IN SOLID POLYMERS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 26, No 7, Jul 84 (manuscript received 27 Jan 83) pp 1513-1518

MARDALEYSHVILI, I. R., KUTYRIN, V. A., KARPUKHIN, O. N. and ANISIMOV, V. M.,
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[Abstract] A study was made of the kinetics of processes of relaxation of impurity molecules of aromatic hydrocarbons with condensed nuclei based on their reactivity in photooxidation in solid polymers at temperatures below T_c . It was found that the kinetics of relaxation processes, like the kinetics of many other chemical reactions in solid polymers, follow a stepped curve. After a certain depth of conversion is reached, varying with temperature, the effectiveness of the relaxation process dropped sharply and kinetic shutdown occurs. It is concluded that impurity molecules are not equivalent with respect to processes which change their reactivity. Quantitative parameters are suggested, plus effectiveness and inhibition factors, allowing the kinetics of relaxation processes to be described. Figures 4; references 9: 7 Russian, 2 Western. [342-6508]

SPECIFICS OF POLYMERIZATION OF CERTAIN PERFLUORINATED AROMATIC AND ALICYCLIC COMPOUNDS IN A GLOW DISCHARGE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 26, No 7, Jul 84
(manuscript received 2 Feb 83) pp 1525-1530

GIL'MAN, A. B., SHIFRINA, R. R., PLATONOV, V. Ye., DVORNIKOVA, K. V.,
KOLOTYRKIN, V. M., (deceased), POTAPOV, V. K. and YAKOBSON, G. G., Scientific
Research Institute of Physics and Chemistry imeni L. Ya. Karpov; Novosibirsk
Institute of Organic Chemistry, Siberian Department, USSR Academy of Sciences

[Abstract] A study was made of polymerization of certain polyfluorinated compounds containing aromatic rings, alicyclic elements and the CF_3 group in a glow discharge: perfluorobenzocyclobutene (I), perfluoroindane (II), perfluorotetraline (III), perfluoro-o-xylene (IV), perfluoromesitylene (V), perfluorocyclopentene (VI), perfluorocyclohexene (VII) and perfluorodecaline (VIII). The data obtained allow the increase in rate of formation of polymer films from perfluoroaromatic compounds in a glow discharge to be related with some confidence to the presence in the compounds of ortho-located alkyl groups or the possibility of their formation in the process. Figures 3; references 18: 11 Russian, 7 Western.
[342-6508]

USE OF X-RAY DIFFRACTION METHOD TO STUDY INTERACTION OF PLASTICIZERS WITH CRYSTALLINE AREAS OF NITRATE CELLULOSE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 26, No 7, Jul 84
(manuscript received 8 Jun 83) pp 1553-1556

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organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences

[Abstract] The purpose of this work was to demonstrate that molecular plasticizers can actively interact with nitrate cellulose (NC) crystals leading to various structural changes easily recorded by x-ray diffraction methods. The examples stated include binary systems of NC with formal glycerine, dibutylphthalate and a ternary system NC-ethanol-diethylether. Studies were performed in highly concentrated specimens prepared by nitration of bleached linen fibers in sulfuric-nitric acid mixtures for two hours at room temperature. Binary mixtures were prepared by direct application of the plasticizer to the fiber at the point of transmission of the x-ray beam. The ternary mixture was studied in glass capillaries 1.5 mm in diameter. The studies show that when molecular plasticizers are introduced to the NC matrix, a variety of processes may occur such as further crystallization of the crystallites, formation of solid solutions and molecular complexes. The study of these

processes is necessary for proper construction and interpretation of state diagrams as well as an understanding of the mechanism of interaction of NC with plasticizers. Figures 3; references 5: 3 Russian, 2 Western.
[342-6508]

UDC 678.5.01:537.226+539.2:530.12.04

ACCUMULATION OF SPACE CHARGE IN POLYMERS UPON BOMBARDMENT WITH FAST ELECTRONS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 5, May 84 pp 1127-1130

DYRKOV, V. A. and YEVDOKIMOV, O. B., (deceased), Scientific Research Institute of Electron Introscopy, Tomsk Polytechnic Institute imeni S. M. Kirov

[Abstract] An experimental study is presented of the accumulation of space charge in polymers in the 193-303K interval in the process of nonuniform high energy electron injection. Accumulation of the charge was studied in polymethylmethacrylate, polycaproamide, polystyrene and polyethylene. Specimens were bombarded with a stream of electrons from a betatron. Electron energy was 3 MeV, beam flux density $5 \cdot 10^{-11}$ to $3.2 \cdot 10^{-10}$ A/cm². A grounded graphite absorber placed before the specimen assured non-uniform injection of electrons through the thickness of the specimen. The distribution of charge through the specimens was measured at 273 and 293K. The space charge was found to separate in layers when the specimens were heated. This space charge layer separation effect has a threshold nature, occurring when the field in the specimen reaches a critical value which increases with decreasing temperature of bombardment and is generally less for polycaproamide than for the other substances. Layer separation does not occur in nonpolar polymers such as polystyrene and polyethylene. The space charge layer separation effect results from development of electrical instabilities in the charge system and polar groups. Figures 5; references 5: Russian.
[287-6508]

UDC 541.64:547.1.128

SYNTHESIS AND PROPERTIES OF POLYARYLATES CONTAINING SILICON

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNLOGIYA in Russian Vol 27, No 6, Jun 84 (manuscript received 25 Oct 82) pp 704-706

BURYGIN, L. K., SHELUDYAKOV, V. D., YEGORSHIN, V. I. and FEDOTOV, N. S., Department of Organic and Biological Chemistry, Kalinin State University

[Abstract] A simple method has been developed for synthesizing polyarylates containing siloxane groups in the chain by interphase polycondensation of α, ω -bis-chloroformatomethyl(phenyl)oligosiloxanes with oligoarylate diols

based on phenolphthalein terephthalate and bis-phenol A. Block copolymers were synthesized in a system consisting of a chlorinated hydrocarbon plus water at 291-293K. The polymers were separated from solution by precipitation in ethanol. The influence of polycondensation reaction conditions on yield and viscosity was studied for a siloxane with 40 dimethylsiloxane groups. The degree of polymerization was determined by PMR spectroscopy. The results showed that polymers with high molecular weight are obtained by introducing triethylamine to the reaction at 1.5% of the mass of the phenolphthalein terephthalate. The block copolymers are soluble in chloroform, methylene-chloride, tetrachloroethane, tetrahydrofuran and dimethylformamide. Films produced by pouring from solution into chloroform are transparent, water resistant and resistant to the effects of dilute solutions of alkalis and acids. They have high gas permeability and gas separation selectivity. Figures 2; references 3: Russian.
[339-6508]

UDC 678-13+542.971

COPOLYMERIZATION OF ISOBUTYLENE WITH TRIMETHYLVINYLOXYSILANE

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNLOGIYA in Russian Vol 27, No 6, Jun 84 (manuscript received 16 Aug 82) pp 707-710

GLADKIKH, I. F., SANGALOV, Yu. A., KOMAROV, N. V. and LISOVIN, Ye. G.,
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[Abstract] A study was made of the copolymerization of isobutylene with trimethylvinylloxysilane and several transformations of the copolymer product. Copolymerization was performed by placing 3 g of catalyst in a reactor in 30 ml toluene and adding a calculated quantity of the comonomers with agitation at 253K, trimethylvinylloxysilane first. After 20 minutes the polymerizate was decanted. Hydrolysis of copolymers was performed by treatment with water vapor in an acid medium. The composition of the copolymers was determined by elemental analysis. Derivatographic and thermomechanical analyses were performed as well. It was found that the use of the heterogeneous catalyst based on a sulfocationite permitted production of true copolymers of isobutylene with trimethylvinylloxysilane, not contaminated with residue from the catalytic system. The silicon-containing monomer is quite active in comparison to isobutylene. The introduction of $-OSiR_3$ groups to the polyisobutylene gives it chemical activity, particularly the capacity for hydrolysis, allowing its physical and chemical properties to be altered. Figure 1; references 4; Russian.
[339-6508]

SYNTHESIS AND PROPERTIES OF AMMONIUM POLYMERS BASED ON VINYL BENZYL BROMIDE COPOLYMERS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 27, No 6, Jun 84 (manuscript received 21 Jun 82) pp 711-713

SALIDZHANOVA, N. S., RAKHMATULLAYEV, Kh. and DZHALILOV, A. T., Department of Plastic Processing Technology, Tashkent Polytechnic Institute imeni A. R. Beruni

[Abstract] Amination of copolymers was performed in a solution of dioxane at 293K, the amination products precipitating. Ir, PMR and UV spectra were recorded. The flocculating effect of ammonium polymers synthesized on the completeness and rate of precipitation of the silica gel suspension was determined by the movement of the solid-liquid boundary. The data indicate that when the solutions produced are diluted, polyelectrolyte swelling occurs as a result of electrostatic repulsion of the like-charged polymer chain links containing ammonium groups. A copolymer of vinyl-benzylbromide with acrylic acid, aminated with trimethylamine, has superior flocculating capability to all other ammonium copolymers studied. The area of optimal concentrations in which the maximum precipitation of solid particles is achieved depends on the nature of the water soluble polyelectrolyte, varying from 0.05% to 0.2% for the substances studied. The data indicate that synthesis of ammonium polymers based on vinylbenzyl-bromide-acrylic acid copolymers and methylmethacrylate is a promising means for producing flocculating agents. Figures 4; references 3: Russian.
[339-6508]

UDC 542.952/954

COPOLYMERIZATION OF BENZALDEHYDE WITH ACRYLONITRILE

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 37, No 6, Jun 84 (manuscript received 20 Apr 83) pp 368-372

DURGARYAN, A. A., ARAKELYAN, R. A., BADOYAN, E. A. and KARAPETYAN, Zh. V., Yerevan State University

[Abstract] A study is made of copolymerization of benzaldehyde with acrylonitrile under the influence of alkali metal alcoholates as well as their complexes with naphthalene. The copolymerization of equimolar mixtures of benzaldehyde and acrylonitrile under the influence of various catalysts under various conditions was first studied. The IR spectra of the copolymers produced indicate that acrylonitrile reacts primarily at the vinyl group, benzaldehyde at the aldehyde group. The variation in copolymers as a function of composition of the initial mixture was also studied for copolymerization

of benzaldehyde with acrylonitrile in lithium ethylate and sodium tert-butylate, as well as DMFA at 0°C, plus lithium and sodium-naphthalene complexes at -33°C in DMFA. A reaction equation is suggested for chain growth. References 12: 7 Russian, 5 Western.
[341-6508]

UDC 678.63+678.048

INFLUENCE OF POLYCONJUGATE SYSTEMS ON THERMAL STABILITY OF POLYCHLOROPRENE

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 37, No 6, Jun 84
(manuscript received 27 Jun 83) pp 373-377

KHARATYAN, V. G., GEVORKYAN, S. B. and GAVALYAN, V. B., Institute of Organic Chemistry, Armenian SSR Academy of Sciences, Yerevan

[Abstract] A study is made of the influence of polypropargylaniline (PPA) and polydipropargylaniline (PDPA) on the thermal and thermal-oxidative destruction of PCP in order to determine the full spectrum of action of PPA and PDPA. A comparative study of the thermal and thermal-oxidative destruction of PCP with no additives and PCP containing 2 wt. % PDA and 2 wt. % PDPA was undertaken. According to TGA the thermal decomposition of PCP with no additives begins at 210°C, of PCP with PDA--at 215-220°C. The medium used was found to have no influence on the beginning of thermal destruction of PCP with additives. PPA and PDPA both have some stabilizing influence on the thermal stability of PCP and shift at the beginning of thermal destruction into the higher temperature area. Figures 4; references 9: 8 Russian, 1 Western.
[341-6508]

UDC 535.33:535.312

RADIATION-OPTICAL PROPERTIES OF COATINGS MADE OF ZIRCON

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 5, May 84 pp 1160-1161

MALOV, M. M., AGAFONTSEV, V. F., CHETVERIKOV, A. N. and SOLOV'YEV, G. G.,
Moscow State University imeni M. V. Lomonosov

[Abstract] A study is made of two types of coatings based on zircon powders obtained by the same method but differing in concentration of Li_2O (type I - 0.20%, type II - 0.35%). The binder was liquid potassium glass. Coating specimens were bombarded with 500 KeV protons of flux density not over $6 \cdot 10^{12} \text{ cm}^{-2}\text{s}^{-1}$. The type II specimen was significantly more radiation resistant to proton bombardment than type I. It is therefore found that increasing the concentration of Li_2O increased the radiation resistance. Figures 3; references 2: Russian.
[287-6508]

RUBBER AND ELASTOMERS

RUBBER PROPERTIES MADE TO ORDER

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Sep 84 p 1

[Interview with L. Karpenko, deputy minister of the USSR Ministry of the Petroleum Refining and Petrochemical Industry, by SOTSIALISTICHESKAYA INDUSTRIYA correspondent, V. Kremer, on the subject of the International Conference on Raw and Cured Rubber]

[Text] Today, the International Conference on Raw and Cured Rubber, in which more than 30 countries are participating, opens in Moscow. On the eve of its opening our correspondent, V. Kremer, asked L. Karpenko, chairman of the conference organizing committee and deputy minister of the USSR Ministry of the Petroleum Refining and Petrochemical Industry, to discuss the most interesting developments by Soviet scientists in the area of polymer chemistry.

The Soviet rubber industry is founded primarily on the use of synthetic rubbers, the production of which on an industrial scale was first mastered in our country under the leadership of Academician S. V. Lebedev. They opened great, theoretically unlimited possibilities for purposefully changing the properties of elastomers. We now produce more than 230 types and marks of synthetic rubbers and latexes. The Soviet Union leads the world in the level of their use.

Recently, there has been a marked tendency toward the preferred production of special purpose rubbers, predetermined for the manufacture, say, of agricultural tires, sealing or heat insulating materials or different types of rubber footwear. Many of them are already being produced on an industrial scale, while others are only in the experimental stage. Rubbers of a stereospecific structure—for example, isoprenes and butadienes—attained broad usage due to a number of important parameters which surpass natural rubber. At the Lower Kama Petro-technology Association facility, an automated factory for producing nonhelium isoprene rubber with predetermined properties is in full operation.

The development and introduction of original technology for obtaining butyl rubber, thus ensuring a substantial improvement of the economic indicators of this complex process, was a notable achievement of Soviet engineering thought. As a result of the creative cooperation between field and academic scientific research institutes, the creation and mastery of production of a new frost-resistant fluorine rubber has been achieved.

Among the specially designated synthetic rubbers, the siloxane rubbers occupy a special role. They are used in the area of medicine. It has been proven that such rubbers are the best suited for articles found in lengthy or even lifelong contact with the human organism. They are sufficiently inert in the biological relationship and cause less irritation to living tissue than any other polymer material. Artificial heart valves and prostheses for joints, bones and blood vessels are made from siloxane medical rubber, as well as components for heart pacers and other medical technology.

The unique film materials created on the basis of polysiloxanes have great practical importance. The so-called gas-selective membranes manufactured from them make possible a 1.5- to threefold increase in the storage life of fruits and vegetables.

Specialists all over the world place great hopes in the synthesizing theory and the mastery of production technology for liquid rubbers developed in our country. And this is understandable: the new type of rubber, in principle, makes it possible to reject the laborious, multistage technology for preparing automobile tires, having substituted for it a more progressive method of molding. Experimental samples of molded tires are already at the test stage. But, as of yet, this operation is of a rather painstaking nature. The industrial introduction still requires rather lengthy, laborious research.

On the whole, the tire industry is now oriented toward a further increase in the production of tire casings with contemporary radial construction, which have a mileage life 1.5 times as great when compared with diagonal tires. The mass production of "R"-type tires using only synthetic rubber was first mastered in the USSR. Research is being successfully undertaken in the area of the mechanics of radial tires to improve their use qualities in the "road-tire-automobile-driver" system.

The production of tires for heavy-duty vehicles and agricultural technology is being developed especially intensively. Giant tires for mining dump trucks with load capacities of 110 and 180 tons are being developed and introduced, ensuring the reliable use of the powerful vehicles in various climatic zones. The world's largest wide-profile, low-pressure tubeless tire has been created. Its basic advantage is in the combination of high load with a low specific pressure on the soil--0.8-1.0 kilograms per square centimeter--which is especially important for field operations. Among the recent innovations for rural workers are radial tires with a specially designed tread, intended for tractors operating in moist and swampy soils, in flooded rice fields and on slopes.

Soviet automated production lines for assembling tire casings have received distinguished recognition. Their design embodies more than a few original solutions, which have been patented in Great Britain, France, the Federal Republic of Germany, the United States and other countries. Production lines with a high degree of automation are also used for the vulcanization of tires. Essentially, we have now reached the point when robotized complexes will be able to undertake the basic processes of manufacturing tires and other rubber articles. The necessary scientific and technological prerequisites for this already exist.

The international conference which has opened in Moscow will be yet another step in broadening our knowledge about raw and processed rubber. It will open new areas of use for this material whose properties are unique in nature and will help accelerate the pace of scientific and technological progress, while strengthening the cooperation of scientists from various countries.

12318

CSO: 1841/372

INTERNATIONAL CONFERENCE ON RAW AND CURED RUBBER

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Sep 84 p 1

[Article by the USSR Council of Ministers greeting participants of International Conference on Raw and Cured Rubber]

[Text] The USSR Council of Ministers sincerely greets the participants and guests of the annual International Conference on Raw and Cured Rubber.

Contemporary chemical science and industry play a leading role in accelerating the pace of scientific and technological progress. This is equally true of polymeric chemistry, and in particular, of raw and cured rubber.

The efforts of scientists in researching and creating new types of elastomers, the research on the mechanics of rubber and achievements in designing articles with it influence increasingly the development of automobile construction, space technology, agricultural engineering and other branches of industry.

The exchange of experience and scientific ideas and business contacts at our conference, in which eminent scientists and specialists of many countries are participating, have great significance for economic development and the increase in the living standard of the people.

The collaboration of scientists from various countries facilitates the growth in mutual understanding and trust and serves to strengthen world peace. The Soviet Union consequently advocates the broadening and deepening of such contacts.

We wish the conference participants fruitful labor and creative successes in future scientific and applied activities.

12318

CSO: 1841/372

UDC 678.023.582.78

EFFECT OF MODIFYING PULVERIZED VULCANIZER WITH S-NITROSOAROMATIC AMINES ON
COLD-RESISTANCE OF RESINS BASED ON CIS-POLYBUTADIENE

Moscow KAUCHUK I REZINA in Russian No 8, Aug 84 pp 10-12

KOSTRYKINA, G. I., IZYUMOVA, V. I., SOLOV'YEV, M. Ye. and ZAKHAROV, N. D.,
"YaPI [expansion unknown; Yaroslavl Polytechnic Institute?]

[Abstract] At low temperatures properties of resins based on stereo-regular rubbers with pulverized vulcanizer (PV) are determined by the PVs and the type of vulcanizing system. The present article reports on the impact of various vulcanizers in cis-butadiene. Modifiers used included N-(2-methyl-2-nitropropyl)-4-nitrosoaniline (nitrole) and 4-nitrosodiphenylamine (PNDFA). Cold resistance, measured by a coefficient of recovery after chilling showed significant improvement both PV modifiers. This was explained in part by reduced crystallization of the thiuram resins when they contained PV particles. When free modifiers were cleaned from the mix, cold resistance decreased to the level of that for control samples. The ultraviolet spectra of ethanol extracts were typical for S-nitroso-groups only in a 0.1-0.2 mm surface layer, thus suggesting that free modifier diffusion has little penetration. Thus mechanical-chemical mixing of PV particles was judged essential to improve cold resistance of the modified resins. Figures 2; references 11: Russian.
[380-12131]

UDC 678.762.3.023.01

STRUCTURE AND PROPERTIES OF ISOPRENE RUBBER OBTAINED USING LOW-TEMPERATURE
COMPLEX CATALYST

Moscow KAUCHUK I REZINA in Russian No 8, Aug 84 pp 14-16

PISKAREVA, Ye. P., BUDER, S. A. and KOVALEV, N. F., All-Union Scientific
Research Institute for Synthetic Rubber imeni S. V. Lebedev

[Abstract] SKI-3 isoprene rubber produced with more effective catalysts has reached amounts of microgel, especially of "heavy fractions". The present article reports on the effect of a complex low-temperature catalyst on basic

structural properties and plastoelastic properties of SKI-3 synthesized using low-temperature complex production catalysts. Molecular weight distribution of the ash fraction as well as the composition and structure of the microgel were compared for various catalyst types. The low-temperature catalyst yielded rubber with compact particles of molecular dimensions whose weight exceeded the average weight of individual polymer molecules by only 20 times. Gel was not discernible by traditional methods of analysis. The low-temperature catalyst thus was judged to produce a more dispersed heterogenic solid phase. The softer rubber without microgel was related to specific highly dispersed characteristics of the catalyst in the polymerized system. Figures 2; references 8: Russian.

[380-12131]

UDC 678.046.3

USE OF WOLLASTONITE AS FILLER OF RESIN MIXTURES

Moscow KAUCHUK I REZINA in Russian No 8, Aug 84 pp 20-22

IBADULLAYEV, A., YUSUPBEKOV, A. Kh., ABDURASHIDOV, T. R. and URAL'SKIY, M. L., Tashkent Polytechnical Institute; "Kauchuk" Production Association

[Abstract2 Efficient use of natural resources and waste products has led to study of Wollastonite as a filler for resin mixes, since Wollastonite is in abundant supply. The present article reports on a process including enrichment to adjust the content of SiO_2 , FeO and GaO . Properties of Wollastonite, asbestos and talc were compared using standard SKI-3, KR-50 and SKMS-30RP mixes. Data obtained indicated that Wollastonite ore gave rubber a crystalline structure and was more anisotropic than when Wollastonite concentrate was employed. The former had more adsorbent surface and displayed relatively less residual deformation. The compositions using Wollastonite were equal to asbestos and talc variants of similar formulas. After further production testing, these fillers are recommended for wide uses. Figure 1; references 11: 8 Russian, 3 Western.

[380-12131]

STUDY OF COLD CURING AND ADHESION TO METAL OF HYDRAZIDE RUBBER COMPOSITIONS WITH EPOXY RESINS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 6, Jun 84
(manuscript received 25 Mar 83) pp 1352-1357

RYABOVA, M. S., VOLIN, Yu. M., LAZAREV, S. Ya., KULIKOVA, M. N., BARABAN, O. P., and BELOV, I. B., Leningrad Institute of Technology imeni Lensovet; All-Union Scientific Research Institute of Synthetic Rubber imeni Academician S. V. Lebedev

[Abstract] A study is presented of compositions of hydrazide rubbers with epoxy resins as a basis for cold curing adhesives. Data are presented on the adhesion of cured compositions to steel type 3, as well as the kinetics of curing at room temperature. It is shown that acid-base type catalysts can be used to reduce curing time. The adhesion strength of the compounds with steel type 3 is 5 to 6 MPa, allowing them to be used as a basis for cold curing adhesives with increased adhesive film elasticity. Carboxylic acids are shown to be active catalysts of curing of SKI-GD compositions with MEG-2 aliphatic resin and ED-20 diene resin. These acids decrease gel formation time greatly. The most effective of the catalysts studied is trifluoroacetic acid which accelerates the cold curing process by a factor of 2 to 5 in proportion to its concentration and produces an adhesive bond strength of up to 9 MPa. Figures 3; references 12: Russian.
[356-6508]

UDC 541.64.547.551

MODIFICATION OF CIS-POLYISOPRENE DISPERSIONS WITH p-NITROSODIPHENYLAMINE, STRUCTURE AND PROPERTIES OF FILMS THUS PRODUCED

Moscow KAUCHUK I REZINA in Russian No 6, Jun 84 pp 6-8

TARASOVA, Z. N., KASHINA, A. A., LYUBITSKAYA, G. A. and KUZNETSOV, V. L., Moscow Institute of Precision Chemical Technology imeni M. V. Lomonosov

[Abstract] The purpose of this work was to study the kinetics of the interaction of p-NDPA and SKI-3 aromatic C-nitrosocompounds in a raw rubber mass, raw rubber solution and aqueous dispersion in order to select the optimal conditions for modification, production of films from modified latex and to study their properties. Comparative studies were performed in a solution of dispersed films, latex and latex films. The latex films were used to produce a 2% solution in m-xylene to which p-NDPA was added in dry form and agitated until completely dissolved. The solution was placed in a 3-neck flask and heated with constant agitation at 80°C. Samples were periodically taken of the m-xylene removed at room temperature. Alcohol extracts produced from films were used to determine free p-NDPA. Modification of cis-polyisoprene by p-NDPA

in the latex stage was found to be possible at 60°C. The interaction of SKI-3 with p-NDPA is practically not accompanied by processes of destruction of structuring of the polymer. The process of film formation from p-NDPA-modified DSKI-3 results in the formation of oriented fibrillar structures primarily of closed types. Electron photomicrographs of film surfaces are presented. Figures 5; references 8: 6 Russian, 2 Western.
[332-6508]

UDC 678.5-944.22/25

STABILIZATION OF CHLORINE-CONTAINING POLYMERS

Moscow KAUCHUK I REZINA in Russian No 6, Jun 84 pp 11-12

GLAZOLEV, V. A., LYUSOVA, L. R., KORNEV, A. Ye. and KOPYREVA, N. I., Moscow Institute of Precision Chemical Technology imeni M. V. Lomonosov

[Abstract] A study was made of the influence of treating certain domestic chlorinated rubbers as well as poly-1,1,2-trichloro-1,3-butadiene with aqueous solutions of stabilizer on the thermal stability and adhesive properties of the polymers. The method of experimental planning was used to select optimal conditions for treatment of the rubbers with aqueous stabilizer solutions. Factors varied included concentration of stabilizers in water, temperature and processing time. The optimization criterion was an increase in thermal stability of adhesive compositions. For all of the materials studied, the curves of thermal stability showed a maximum. The optimal concentration of hexamethylene tetramine depends on the type of chlorine-containing polymer. It is 1% for PTCB, 5% for chlorine-containing raw rubbers, related to the differing adhesive properties of the polymers. Figure 1; references 10: Russian.
[332-6508]

UDC (678.033.+678.028)01

ADHESIVE PROPERTIES OF RUBBERS BASED ON COMBINATION OF CHLOROBUTYL RUBBER AND HIGHLY SATURATED ELASTOMERS

Moscow KAUCHUK I REZINA in Russian No 6, Jun 84 pp 12-14

MAKSIMOVA, N. S. and SHVARTS, A. G., Scientific Research Institute of the Tire Industry

[Abstract] The strength properties and adhesion to brass of chlorinated butyl rubber improve in the presence of alkylphenol disulfide formaldehyde oligomer octophor 10S. This article reports its influence on adhesion to rubber mixtures based on raw rubbers and to brass. Studies were performed on rubber I, obtained using sulfur and combined vulcanizing systems with sulphenamide M as

accelerator, technical charcoal PM-50, BS-120 carbon black and zinc oxide as fillers. The method of simplex-lattice experimental planning was used to describe changes in adhesive properties of rubbers based on SKI-3, SKD and CBR. The covulcanizates studied show increased layer bond strength when more than 75 mass parts CBR are present as a result of the high degree of thermodynamic affinity of butyl rubber and chlorinated butyl rubber. The bond strength of the covulcanizate with CBR content over 75 mass % is less in the presence of a combined vulcanizing system than with a sulfur vulcanizing system, since in this case the influence of the high degree of cross linking of rubber I predominates over the influence of octophor 10S. The bond strength of rubber I with brass increases with increasing content of SKI-3 and particularly SKD, and decreases with increasing content of CBR as a result of the great influence of the saturation of CBR molecules, predominating over the influence of polar reactive chlorine atoms present in the molecules. The use of a combination of CBR (80 mass parts) plus SKI-3 (10-20 mass parts) plus SKD (10-0 mass parts) and a sulfur plus octophor 10S vulcanizing system in the manufacture of reinforced products assures satisfactory bond strength between rubber and brass or rubber after vulcanization. Figures 3; references 6: 5 Russian, 1 Western.
[332-6508]

UDC 678.01:539.52

WORK OF RUPTURE OF RUBBERS UNDER VARIOUS LOADING CONDITIONS

Moscow KAUCHUK I REZINA in Russian No 6, Jun 84 pp 14-17

ZUYEV, Yu. S. and SHTERN, T. M., Scientific Research Institute of the Rubber Industry

[Abstract] The rupture of rubber was studied with limited deformations, reproducing the process of three dimensional rupture, one dimensional rupture and brittle rupture. Based on the data obtained, the specific work of rupture W was calculated by dividing the work of rupture by the deformed volume. Rubbers based on amorphous and crystallizing raw rubbers filled and containing 55 mass parts technical carbon type PM-75 or 30 mass parts PT-100 were selected for determination of the specific work of fracture. Deformation rate significantly influences W by changing the rupture mechanism. However, in a narrow range of speed with a single highly elastic rupture mechanism, the values of W differ by only 5 to 15%. Comparison of the values of W for the rubber types studied confirm the qualitative similarity of the values of W determined under limited deformation conditions and their significant difference from the parameters determined in uniaxial extension. Figure 1; references 9: 8 Russian, 1 Western.
[332-6508]

STRUCTURING OF RAW RUBBERS WITH ALKYL CARBOXYMETHYLMETHACRYLATE GROUPS WITH CALCIUM HYDROXIDE

Moscow KAUCHUK I REZINA in Russian No 6, Jun 84 pp 18-19

MARCHENKO, V. S., All-Union Scientific Research Institute of Construction Structures imeni S. V. Lebedev

[Abstract] A study was made of the influence of unsaturated raw rubbers with alkylcarboxymethylmethacrylate groups synthesized in the presence of fatty acid soaps for sulfonate emulsifiers on the process of vulcanization of DEF-101 raw rubber (a copolymer of 100 mass parts butadiene and 10 mass parts isopropylcarboxymethylmethacrylate). The rubber was purified by washing with a large quantity of acetone during coagulation of the latex. The vulcanizing agent used was 10 mass parts calcium hydroxide. Analysis of the results obtained indicated that removal of water from the rubber mixtures leads to practically complete suppression of salt vulcanization. In this process water is necessary for hydrolysis of the ester groups and solvation of calcium hydroxide and ester groups. However, the effect of fatty acids is not just separation of water as a result of reaction with calcium hydroxide. Since calcium hydroxide is insoluble in rubber, their interaction occurs heterogeneously and only the layers of the polymer in contact with calcium hydroxide particles take part in the reaction. Consequently, cross linking requires transportation of calcium ions to the reaction zone. Fatty acids thus facilitate dispersion of hydroxide in the rubber and interact with calcium hydroxide, liberating water and supporting the transfer of calcium ions to the functional groups. Removal of fatty acid impurities and water from the rubber thus suppresses cross linking of the rubber by calcium hydroxide. Figure 1; references 8: 7 Russian, 1 Western. [332-6508]

UDC 678.065.001.4

MASS OF LOW PROFILE TRUCK TIRE TREADS WITH VARIOUS RELATIVE TREAD DEPTHS

Moscow KAUCHUK I REZINA in Russian No 6, Jun 84 pp 31-33

REKITAR, M. I. and TIMOFEYEV, V. P., Scientific Research Institute of the Tire Industry

[Abstract] The variation and mass of treads and their elements as a function of H/B ratio was calculated. The results of the calculation depend on initial assumptions. The results of calculation of the mass of treads with varying H/B ratio and the elements indicate that when H/B is decreased to 0.6, the mass of the breaker increases by approximately 50%, the mass of the carcass including sidewall decreases by 30%, the mass of the tread increases by 20%. When H/B is increased to 0.7, the mass of the tread decreases, then remains

constant, the maximum reduction being about 10%. Low profile tires require special materials for manufacture of the breaker. High strength materials allow breaker thickness to be minimized. The optimal low profile tires for trucks and buses have $H/B=0.7$ and are made using special breaker rubber with improved physical and mechanical properties. Figure 1; references 6: Russian. [332-6508]

UDC 661.432(088.8)

STUDY OF PURIFICATION OF AMMONIUM-CONTAINING WASTE WATER

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA
TEKHNOLOGIYA in Russian Vol 27, No 6, Jun 84 (manuscript received 17 Jan 83)
pp 742-743

KUDRYAVSKIY, Yu. P., VASILENKO, L. V., ZUYEV, A. N. and YAKOVENKO, B. I.,
Department of Physical-Chemical Technology of Environmental Protection,
Bereznikovo Branch, Institute of Titanium; Ural Institute of Forestry;
Bereznikovo Titanium-Magnesium Combine

[Abstract] Study of the effectiveness of various methods has shown one of the most effective means of decontaminating ammonia-containing waste waters to be oxidation of the ammonium ions with hypochlorites in an alkaline medium. Calcium hypochlorite and hypochlorite pulp formed in the purification of waste gases containing chlorine with lime milk are most convenient for industrial performance of this process. Experiments have established that feeding waste water beneath a layer of hypochlorite pulp results in oxidation of the ammonium ions and significant intensification of the process of decomposition of the calcium hypochlorite. Decomposition time is reduced from 6-10 hours to 10-20 minutes. The results obtained indicated that this method for mutual decontamination of production wastes is highly effective. This technology was tested in experimental installations and under industrial conditions on existing equipment. References 4: Russian.
[339-6508]

UDC 628.34

USING OZONE IN PROCESSES OF DEEP PURIFICATION OF NATURAL AND WASTE WATERS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 57, No 6, Jun 84
(manuscript received 22 Jul 83) pp 1287-1290

SHABOLDO, P. I., SAMARIN, A. F., ZINCHUK, L. N. and PROSKURYAKOV, V. A.

[Abstract] Results are presented from studies of deep purification of waste water from an instrument building plant. The physical and chemical properties of the pollutant involved are quite varied, consisting of various classes of

organic and inorganic substances with low concentrations of the component. The total level of pollution is 15-20 mgO₂/l. Pollutants include isopropyl alcohol, ethyl alcohol, toluene, oxalic acid, ammonium and sodium hydroxides, sodium phosphate and hydrogen peroxide. It is shown that ozonation of waste water achieves 92-98% purification at pH greater than 9, contact 35-45 minutes and ozone 50-60 mg/l. Increasing pH significantly improves the speed and depth of oxidation of the pollutants. The ozone utilization factor per contact stage is 25%, varying with process conditions. This requires reutilization of ozone, addition of catalytic additives and improvement of contact apparatus design. Figures 2; references 14: Russian.
[356-6508]

UDC 628.165

DETERMINATION OF REAGENT DOSES TO STABILIZE WATER BEFORE DESALINATION BY HYPERFILTRATION

Kiev KHIMIYA I TEKHOLOGIYA VODY in Russian Vol 6, No 3, May-Jun 84
(manuscript received 9 Nov 82) pp 210-213

KARELIN, F. N., ASKERNIYA, A. A. and SADYKHOV, N. Ya., All-Union Scientific Research Institute of Water Supply, Sewerage Water Engineering Structures and Engineering Hydrogeology, Moscow

[Abstract] An equation is presented for the required pH of the solution being treated by a semipermeable membrane to assure reliable operation. As the solution being treated increases in concentration, pH increases. This means that as the solution moves through filtering elements in the desalination apparatus, the membranes find themselves under increasingly unfavorable operating conditions. Equations are presented for computation of the dose of reagents required to stabilize processing of highly concentrated waters containing over 15 g/L salts. The UD-1 hyperfiltration installation, desalinating sea water acidified to pH 5.5-6.5, has operated for 4400 hours without formation of a precipitate on the membrane. Salt retention of the membranes and the apparatus has not significantly decreased, though productivity has dropped from 205 to 115 L·day⁻¹ m⁻² as compared to desalination of softened nonacidified water, in which case the same decrease in productivity was observed in about 2900 hours of operation and retention of chlorides decreased from 85 to 60%, and a calcium carbonate precipitate was formed on the membranes. Figure 1; references 5: Russian.
[320-6508]

FORMATION AND REVERSE OSMOTIC PROPERTIES OF DYNAMIC POLYACRYLAMIDE MEMBRANE

Kiev KHIMIYA I TEKHOLOGIYA VODY in Russian Vol 6, No 3, May-Jun 84

(manuscript received 7 Dec 82) pp 214-217

PILIPENKO, A. T., TSAPYUK, Ye. A., DEDECHEK, V. L. and KUCHERUK, D. D.,
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[Abstract] A study is presented of the formation of a dynamic membrane made of polyacrylamide as well as the influence of its structure on reverse osmotic properties with respect to an aqueous saccharose solution. The membrane-forming additive used was PAA with molecular mass $3.97 \cdot 10^6$, determined by the viscosimetric method. Osmotic experiments were performed in a temperature-controlled periodic cell with a volume of 45 cm^3 , membrane area 18 cm^2 . The relative viscosity was studied over a broad range of pH to provide an estimate for the degree of ionization of the surface of the PAA, which is reflected in the configuration and hydration of its change. The data indicate that ionization of carboxyl groups causes a sharp increase in relative viscosity in the pH 4-6 range. At low pH, with the polyacrylamide molecules tightly twisted, the process of formation of the dynamic membrane consists of formation of a membrane layer in the pores of the substrate, whereas at higher pH (over 5) the PAA macromolecules straighten and form a membrane layer on the surface of the substrate. Change in solution pH and substrate pore size as well as operating pressure and temperature thus influences the very process of formation of the dynamic membrane as well as its osmotic properties. Figures 5; references 11: 7 Russian, 4 Western.
[320-6508]

UDC 622.765

ROLE OF ION-ELECTROSTATIC COMPONENT IN SPLITTING PRESSURE DURING PRESSURIZED FLOTATION OF DISPERSED IMPURITIES

Kiev KHIMIYA I TEKHOLOGIYA VODY in Russian Vol 6, No 3, May-Jun 84

(manuscript received 13 Sep 83) pp 217-219

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[Abstract] The flotation of colloidal magnesium hydroxide was studied to clarify the role of the ion-electrostatic factor under conditions designed to form flake-like particle aggregates. The charge on magnesium hydroxide was altered by addition of a cation-active surfactant, acetyltrimethylammonium bromide, as well as an anion active surfactant, sodium dodecylsulfate. Experiments were performed in a pressurized flotation machine. The results show that the influence of the ion-electrostatic component of surface forces may be

manifested in several ways: in the elementary flotation event in the stage of approach of the particles with a bubble and in the stage of formation of particle aggregates if conditions are created for appearance of the flotation mechanism based on capture of tiny gas bubbles by the particle aggregates. In the former case the highest flotation effectiveness is achieved where the energy barrier resulting from ion-electrostatic surface forces is eliminated; in the latter case, where flotation of flake-like aggregates occurs by the mechanism of capture of small bubbles, the electrosurface properties of the particles must be modified in size to allow formation of loose but still strong aggregates. Figures 2; references 5: 3 Russian, 2 Western. [320-6508]

UDC 546.212+541.183.2

SORPTION OF PHOSPHORUS AND FLUORIDE IONS FROM AQUEOUS SOLUTIONS BY HYDRATED TITANIUM DIOXIDE

Kiev KHIMIYA I TEKHOLOGIYA VODY in Russian Vol 6, No 3, May-Jun 84
(manuscript received 30 May 83) pp 219-221

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[Abstract] A study is made of the anion exchange capabilities of hydrated titanium dioxide DDT-t obtained by thermal hydrolysis of a solution of titanium sulfate, which differs in a number of respects from the product obtained by precipitation with alkali. Highly dispersed DDT-t with about $180 \text{ m}^2/\text{g}$ surface area produced from sulfate solutions of ilmenite and purified under laboratory conditions was studied. The composition was $\text{TiO}_2 \cdot 1.25 \text{H}_2\text{O} \cdot 0.075 \text{SO}_3$ with about 0.005% Fe_2O_3 and 0.010% Cr_2O_3 impurities. The results are presented as pH isotherms and in a table. DDT-t adsorbs fluorides over a broad pH range and phosphate ions at pH 2.0-5.0. The adsorption is specific due to the high affinity of titanium and its dioxides. Superstoichiometric adsorption of F^- was also observed. The following adsorption series of anions is proposed: $\text{F}^- \sim \text{PO}_4^{3-} \sim \text{SO}_4^{2-}$. Thermal hydrolytic hydrated titanium dioxide, produced in large scale titanium dioxide, is a promising sorbent due to its good adsorption properties for cations and anions with affinity to it, its good chemical, thermal and radiation stability. Figures 2; references 10: Russian. [320-6508]

EQUILIBRIUM NON-ION EXCHANGE DISTRIBUTION OF SULFURIC ACID BETWEEN SOLUTION AND SWOLLEN CATIONITES KU-2 AND KB-4 IN H-FORM

Kiev KHIMIYA I TEKHOLOGIYA VODY in Russian Vol 6, No 3, May-Jun 84
(manuscript received 9 Nov 82) pp 221-223

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[Abstract] A study is made of non-ion exchange distribution of sulfuric acid between an external solution and the swelling solution in KU-2x8 (strongly acid sulfocationite) and KB-4 (weakly acid carboxyl cationite) cation exchange resins in H-form. Using the H_2SO_4 hydration numbers in the solutions found for non-ion exchange adsorption of the acid by the sulfocationite and the material balance equations, the hydration of carboxyl groups in the swollen grains was determined. It was found that only about 18% of the carboxyl groups in the swollen KB-4 cationite were present in the hydrated state. The remaining carboxyl groups are not hydrated and consequently are not ionized. The data obtained indicate that sulfuric acid in swelling solutions within cationite grains and in the external solutions is present as hydrates of identical composition with equal concentrations of the solutions. Two hydrates were found within the concentration range studied: $H_2SO_4 \cdot 6 H_2O$ up to 1.5 mol/kg H_2O and $H_2SO_4 \cdot 4 H_2O$ at $\geq 1.7-1.75$ mol/kg H_2O . The hydration of H_2SO_4 swelling solutions in the strongly acid sulfocationite KU-2 and the weakly acid carboxyl cationite KB-4 is identical if the concentration is identical in the solutions, in spite of the differing degree of hydration and ionization of the functional group in these ionites. References 9: 8 Russian, 1 Western. [320-6508]

UDC 628.1+66.094.3+541.138

REMOVAL OF IRON FROM WATER IN SUSPENDED PYROLUCITE LAYER BY ELECTROLYSIS

Kiev KHIMIYA I TEKHOLOGIYA VODY in Russian Vol 6, No 3, May-Jun 84
(manuscript received 1 Nov 82) pp 224-225

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[Abstract] A study is presented of the basic regularities of electrochemical removal of iron from water in the presence of dispersed manganese dioxide. Studies were performed in a standard electrochemical cell with graphite electrodes, current supplied by a potentiostat. The ratio of quantity of solution in cathodic and anodic portions of the cell was 1:4 with a total volume of 75 ml. Oxidation of Fe^{2+} ion by air in the presence of manganese dioxide without electric current occurs quite slowly, not exceeding 2% in

control experiments in an acid medium. Electrolysis with water of pH 3.64 and anodic current density 5 mA/cm² for 1 minute achieves about 60% oxidation of Fe²⁺ with an initial iron content of 5 mg/l and manganese dioxide dose 5 g/l. Experiments were also performed under dynamic conditions in a flow-through nonpressurized electrolyzer with graphite electrodes. An extreme was found on the curve of iron removal as a function of water flow rate, maximum purification achieved at 7.5-11 m/hr, which produced a residual iron (II) content of 0.2 mg/l, satisfactory for drinking water. Figures 3; references 6: Russian.
[320-6508]

UDC 628.543:541.13:541.128

ELECTROCATALYTIC OXIDATION OF PHENOL ON STATIONARY PLATINUM ELECTRODE

Kiev KHIMIYA I TEKHOLOGIYA VODY in Russian Vol 6, No 3, May-Jun 84
(manuscript received 22 Mar 83) pp 229-232

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[Abstract] A study is presented of the kinetics and mechanism of oxidation of phenol on a platinum electrode in aqueous solutions. Studies were performed by potentiodynamic and galvanostatic methods using a platinum electrode wire activated by repeated anodic-cathodic polarization in a separate cell with 0.5 M H₂SO₄. The polarization curve has a characteristic shape over a broad range of phenol concentration: a gentle slope at 0.21-0.44 V, a steeper slope at 0.06-0.27 V, a maximum of oxidation rate at 0.7-0.8 V, followed by a rather sharp drop. The maximum occurs at lower voltages, the higher the phenol concentration in the solution. This probably results from an increase in the degree of filling of the surface of the electrode catalyst by phenol molecules chemisorbed from the surface. The rate of the electrostatic reaction is determined as a function of the specific conditions either by the stage of activated adsorption of reagents or by the interaction of adsorbed molecules or by the stage of desorption of the reaction products formed. The observed effective reaction rate is the resultant of all of these processes. Figures 3; references 21: Russian.

MECHANISM OF WASHING OF HIGH SPEED FILTERS AND METHODS OF ITS INTENSIFICATION

Kiev KHIMIYA I TEKHOLOGIYA VODY in Russian Vol 6, No 3, May-Jun 84

(manuscript received 5 Nov 82) pp 232-236

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[Abstract] The slowest stage in regeneration of a filter charge is separation of contaminant particles from the surfaces of grains. Separation of particles from grain surfaces occurs under the influence of shear stress on the surface caused by the stream of water through the pore space and by collision of grains. There is at present no sufficiently strict theory to allow optimization of the process of washing. Authors disagree as to whether collision between particles or water washing of particles is more important in removal of contaminants from particles. Several intensive methods of charge regeneration are described, including surface washing, pulsating washing, air and water washing and alternating washing, in which the hydraulic resistance of drainage varies over the area of the filter, with zones of higher and lower resistance alternating. Of all known washing methods, water-air washing provides the highest degree of charge purification, but complicates filter design and operation, although it saves wash water and power. References 15: 12 Russian, 3 Western.

[320-6508]

UDC 628.31:[615.33+615.35(.012.6):628.337/.34

ELECTROCHEMICAL PURIFICATION OF WASTE WATER CONTAINING NONIONOGENIC SURFACTANT

Moscow KHIMIKA-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 18, No 7, Jul 84

(manuscript received 14 Mar 83) pp 870-873

KARPUKHIN, V. F., ZAV'YALOVA, Ye. V., FAYNGOL'D, Z. L., BLINOV, A. V., KUPOVICH, F. V. and MAKAROCHKINA, L. M., All-Union Scientific Research Institute of Antibiotics, State Scientific Research Institute "Khloryproyekt", Moscow

[Abstract] Studies were performed on the oxidation of non-ionogenic surfactants in the process of electrochemical purification. The experiments were performed on a stationary laboratory installation consisting of an electrolysis shell with electrodes, a rectifier, ammeter and voltmeter. Model solutions with various concentrations of surfactants were prepared from DS-10 sintanol. During electrochemical purification of the model solution, the influence of current density on decreasing surfactant concentration was determined. Current density was varied from 0.022 to 0.068 A/cm². A current density of 0.045 A/cm² achieved a surfactant purification factor of 75.5-94%. The experimental data indicate that surfactant concentration can be reduced from

102 to 1 mg/l at pH 6.0, purification effect 99%, electric power consumption 277.2-460.8 Cl/l. Decreasing pH to 3.6 allows the surfactant concentration to be reduced from 1500 to 50 mg/l while reducing the relative concentration of active chlorine. It is desirable to perform electrochemical purification of waste waters with a sodium chloride content of at least 1 g/l in the initial waste water. The pH must be adjusted in each specific case. Figures 3; references 6: Russian.
[359-6508]

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